APR 15 1929

VOLUME XXIV NEW SERIES, NO. 165

JOURNAL
OF THE
AMERICAN STATISTICAL ASSOCIATION

MARCH, 1929

CONTENTS

THE PROBLEM OF PROSPERITY. By Carl Snyder 1

THE ACCURACY OF THE RECORDED BIRTH STATISTICS IN URBAN AND RURAL AREAS. By Jean Downes 15

CAN BUDGET AND COST-OF-LIVING STUDIES BE USED AS AIDS IN DETERMINING A DIFFERENTIAL WAGE? By Asher Achinstein 28

THE PHYSICAL MEASUREMENT OF HOLLINS FRESHMEN, 1920–1927. By Gladys L. Palmer 40

FACTS ABOUT MEXICAN IMMIGRATION BEFORE AND SINCE THE QUOTA RESTRICTION LAWS. By Louis Bloch 50

NOTES:

Another Attempt to Explain Multiple Correlation in Simple Terms. By Bradford Bixby Smith 61

The Population of an Area around Chicago and the Logistic Curve. By Raymond Pearl and Lowell J. Reed 66

A Registration Area for Social Statistics (68); Interest Rates and Security Prices (69); Bank Credit and the Security Market (72); Progress of Work in the Census Bureau (74); Miscellaneous Notes (76); Members Added (82).

REVIEWS 86

RECENT LITERATURE 107

PUBLISHED QUARTERLY BY THE
AMERICAN STATISTICAL ASSOCIATION
PUBLICATION OFFICE: Rumford Press, Concord, N. H.
EDITORIAL OFFICE: Columbia University, New York City

Price $1.50 per copy **$6.00 per annum**

THE EMPLOYMENT CLEARING HOUSE

OF THE

AMERICAN STATISTICAL ASSOCIATION

will aid you with your employment problem. It makes no charge to employers for its services. Any member of the Association may register for a position. There is no fee.

The following positions were open in February, 1929

Field	Pay									
	Under $1800		$1800–2400		$2500–3600		$3700–4900		$5000 and over	
	M	F	M	F	M	F	M	F	M	F
Agricultural Economics			1							
Business Forecasting							1			
Business—Mfg. and Selling	3		3							
Economic and Industrial Research	1	2	2	2	2				1	
Governmental			1		1					
Merchandising			1						1	
Social Work		1				1				
Statistical Secretarial				1						
Teaching									1	

Members were looking for openings as listed:

Field	Pay									
	Under $1800		$1800–2400		$2500–3600		$3700–4900		$5000 and over	
	M	F	M	F	M	F	M	F	M	F
Agricultural Economics					4		2		2	
Business—Mfg. and Selling	3	1	3		3	3	1			
Economic and Industrial Research	2			3	4	2	5		6	
Finance	2	2	2		2				2	
Insurance				1	1					
Marketing			1		2	1			2	
Social Research				3	2	1	1			
Teaching					2	3	2	1	4	
Transportation							2			
Vital Statistics				1		2				

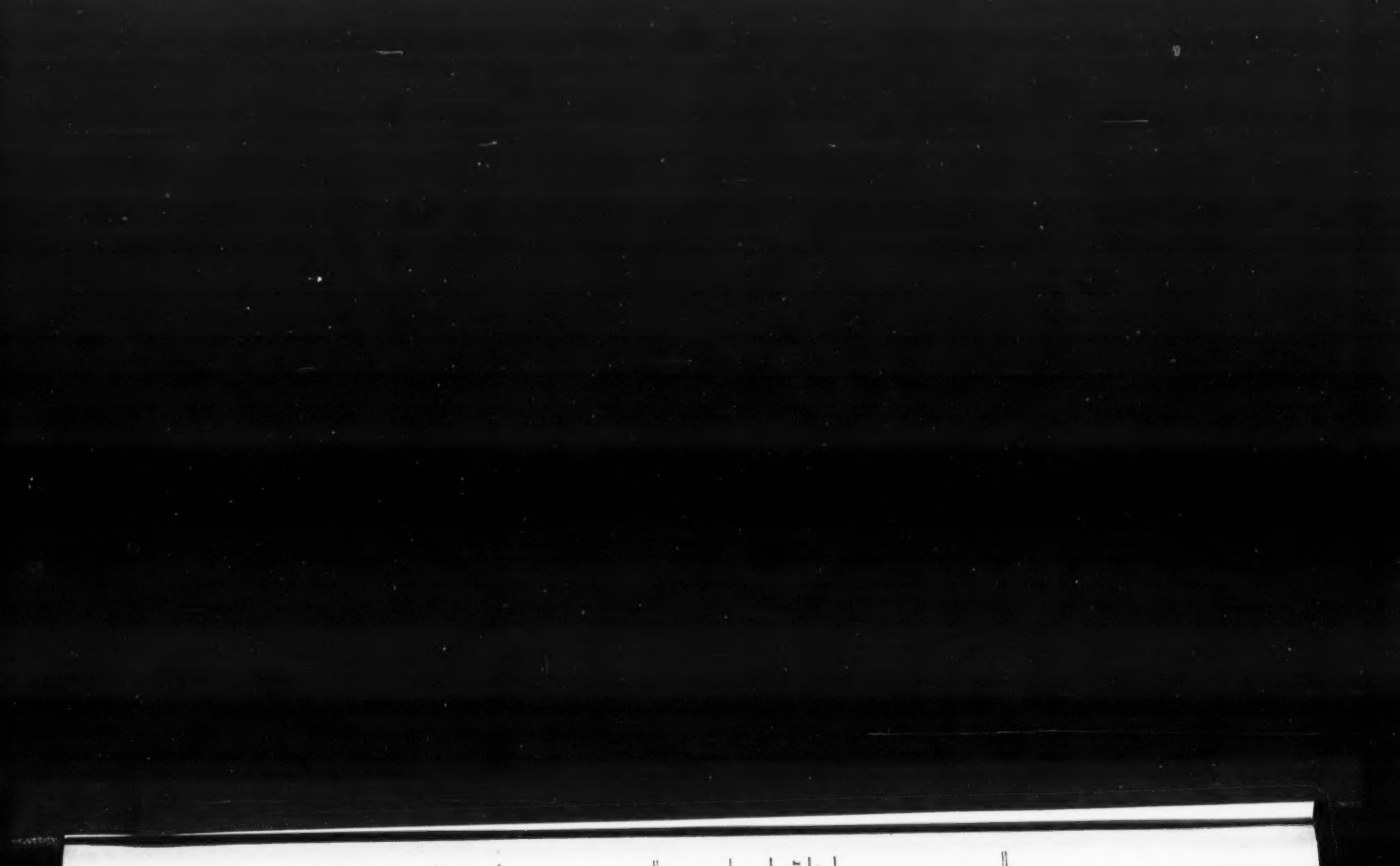
COMMUNICATE YOUR NEEDS TO

MRS. ROSE L. WOODBURY

Secretary's Assistant, American Statistical Association

Room 530, Commerce Bldg., 236 Wooster St., New York City

[NOT A PAID ADVERTISEMENT]



N

J
S
F
=

T
T

C

T

F

N

F

I

NEW SERIES, NO. 165 (VOL. XXIV) MARCH, 1929

JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION

Formerly the Quarterly Publication of the American Statistical Association

CONTENTS

THE PROBLEM OF PROSPERITY. By Carl Snyder 1

THE ACCURACY OF THE RECORDED BIRTH STATISTICS IN URBAN AND RURAL AREAS. By Jean Downes 15

CAN BUDGET AND COST-OF-LIVING STUDIES BE USED AS AIDS IN DETERMINING A DIFFERENTIAL WAGE? By Asher Achinstein 28

THE PHYSICAL MEASUREMENT OF HOLLINS FRESHMEN, 1920–1927. By Gladys L. Palmer 40

FACTS ABOUT MEXICAN IMMIGRATION BEFORE AND SINCE THE QUOTA RESTRICTION LAWS. By Louis Bloch 50

NOTES:

Another Attempt to Explain Multiple Correlation in Simple Terms. By Bradford Bixby Smith 61

The Population of an Area around Chicago and the Logistic Curve. By Raymond Pearl and Lowell J. Reed 66

A Registration Area for Social Statistics (68); Interest Rates and Security Prices (69); Bank Credit and the Security Market (72); Progress of Work in the Census Bureau (74); Miscellaneous Notes (76); Members Added (82).

REVIEWS: Haberler: *Der Sinn Der Indexzahlen*, by M. Taylor (86); Food Research Institute: *British Parcels Prices*, by L. H. Bean (89); Kuczynski: *Wages and Labor's Share in the Value Added by Manufacturer*, by P. F. Brissenden (90); National Industrial Conference Board: *The Fiscal Problem in New York State*, by H. G. Brown (92); Jack: *The Restoration of European Currencies*, and Kisch and Elkin: *Central Banks*, by W. R. Gardner (94); Newlove: *Consolidated Balance Sheets*, by W. A. Paton (96); Mead and Ostrolenk; *Harvey Baum: A Study of the Agricultural Revolution*, by M. K. Bennett (98); Fisher: *The Money Illusion*, by W. R. Burgess (100); *The Finances and Financial Administration of New York City*, by W. J. Shultz (101); Gley: *Die Grossstadte Nordamerikas und die Ursachen ihrer Entwicklung*, by A. P. Usher (102); Burt: *Mental and Scholastic Tests* (103); Wolfenden: *Population Statistics and their Compilation*, by A. J. Lotka (104); Warshow: *Representative Industries in the United States*, by R. S. Meriam (104); Roesle: *Development of the Population from 1910 to 1925*, R. B. Robbins (105); Ihrig: *Internationale Statistik der Genossen-schaften*, by J. Kuczynski (106).

RECENT LITERATURE 107

Published Quarterly by the American Statistical Association

Rumford Press Building, Concord, N. H.

Editorial Office, Columbia University, New York City

Entered at the post-office, Concord, N. H., as second-class mail matter

Acceptance for mailing at the special rate of postage provided for in Section No. 1103, Act of October 3, 1917, authorized April 29, 1922

Officers of the American Statistical Association

ORGANIZED NOVEMBER 27, 1839

PRESIDENT — Edwin B. Wilson

VICE-PRESIDENTS — Francis Walker, Ralph G. Hurlin, Mordecai Ezekiel

COUNSELLORS — F. Leslie Hayford, R. H. Coats, Robert E. Chaddock

SECRETARY-TREASURER — Willford I. King
Room 530, Commerce Building, New York University
236 Wooster Street, New York City

CHAPTER AND DISTRICT SECRETARY

AUSTIN (TEXAS) CHAPTER
Carroll D. Simmons, *University of Texas, Austin, Texas*

CLEVELAND CHAPTER
Harmen B. Flinkers, *Federal Reserve Bank of Cleveland, Ohio*

COLUMBUS (OHIO) CHAPTER
Harry S. Will, *66 Fallis Road, Columbus, Ohio*

LOS ANGELES CHAPTER
Ira N. Frisbee, *331½ North Beverly Drive, Beverly Hills, Calif.*

SAN FRANCISCO CHAPTER
Oliver P. Wheeler, *Federal Reserve Bank, San Francisco, Calif.*

AREA REPRESENTED AND DISTRICT SECRETARY

BOSTON AND VICINITY
Roswell F. Phelps, *Massachusetts Department of Labor and Industries, Boston, Mass.*

CHICAGO AND VICINITY
Robert B. King, *Illinois Bell Telephone Co., 212 Washington Street, Chicago, Ill.*

DENVER AND VICINITY
F. L. Carmichael, *University of Denver, Denver, Colo.*

DETROIT AND VICINITY
A. Heath Onthank, *George Harrison Phelps, Inc., Detroit, Mich.*

PITTSBURGH AND VICINITY
John N. Cover, *University of Pittsburgh, Pittsburgh, Pa.*

WASHINGTON AND VICINITY
John Rhodes, *Federal Reserve Board, Washington, D. C.*

EDITOR — Frank Alexander Ross
405 Fayerweather Hall,
Columbia University, New York City

ASSOCIATE EDITORS — Edmund E. Day, Wesley C. Mitchell, William F. Ogburn, Walter F. Willcox, Leo Wolman
30 Fifth Avenue, New York City

NEW SERIES, NO. 165 (VOL. XXIV) MARCH, 1929

JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION

Formerly the Quarterly Publication of the American Statistical Association

THE PROBLEM OF PROSPERITY[1]

By Carl Snyder

I

Had I a greater competence, or a wider knowledge, I should have chosen as my theme tonight the remarkable movement of recent years which I might call "The Statistical Advance." But, unlike the soothing consonance of the blessed word Mesopotamia, there still clings about the realm of "statistics" I know not what sort of musty, fusty association; the more regrettable, perhaps, because it has come, in our own time, to cover an otherwise alluring adventure into the numerical relationships of this mysterious and baffling world in which we dwell.

Though ours is to be ranked rather among the youngest of the sciences, it is in its nature one of the oldest; almost the archetype of all others. For clearly it was not until ancient man had begun "to count, to measure, and to weigh," that any real science could be born; and these three processes are, in a sense, of the very essence of the statistical method.

It is in keeping with this fundamental character of its investigations that this association should be the oldest of the scientific societies in this country of national scope—older, I find, by nearly half a century than any other association represented at these annual gatherings. The American Statistical Association has now maintained a continuous existence for a twelvemonth less than ninety years; no other has a lineage so ancient. Yet it is only in our own time, and almost within the last decade, that statistical method has fairly reached the dignity of a true science; and only, as it were, under our own eyes that it is emerging from the Cinderella-on-the-doorstep stage in which it remained so long.

[1] Presidential address at the Ninetieth Annual Meeting of the American Statistical Association, Chicago, December 27, 1928.

Now, almost all of the fields of science feel the effects of its salutary discipline and the illumination of its analyses—the later astronomy, biology, and especially the social sciences—but it is in the domain of economics, perhaps, that the greatest promise lies. Secure, even to some extent mummified, in its classical theories, it is largely in our own time that we have seen the beginnings of a quantitative analysis of the newer industrial activities of the world. Not that the sordid problems of livelihood and sustenance, as they were once contemptuously thought of by the philosophers, have not always been the important part of the preoccupations of mankind. But so long as there was relatively little trade between tribes and nations, and, indeed, but little product above the immediate needs of sustenance, almost no banking, and no problems of currency and exchange, a true science of economics could scarcely arise.

But with the immense development of mechanical appliances and the enormous increase of human powers which this has brought, and the parallel widening of human activities, the need of a new kind of knowledge of production, distribution, wealth, income, and employment became imperative. Especially in this country, in the last hundred years, we have come, to our grief, to know the profound effects upon human happiness, and likewise upon economic progress, of the dislocations and disequilibria of these new activities, and notably the influence thereon of the varying supply of capital and credit.

It would be alluring to review with you recent contributions to this field and to consider their effect upon economic theory. My theme tonight is narrower, perhaps more of social than of strictly economic import—a problem that has deeply engaged our philosophy for more than half a century and to which I make bold to believe that the Cinderella of the sciences may offer a solution. We may term it, if you like, the "Problem of Prosperity."

II

For this purpose may I focus attention upon the sixty or seventy years which have elapsed since the beginning of our great Civil War; partly because our knowledge of this period is so much more definite than for any previous time; partly because the economic forces underlying our industrial development have in this period stood out in such vivid relief; partly because the beginning and the latter part were marked by gigantic wars, both in many ways the greatest till then in history, and embodying all the complicating elements characteristic of wars.

One of the primal difficulties of all economic investigation is that the

opportunity for endless repetition, with infinite variation, so characteristic of the physical sciences, is almost wholly lacking. Rarely if ever is the *experimentum crucis*, the touchstone of modern knowledge, available. We deal with shifting sands of human events, and the sequence seems never quite the same. It is perhaps for this reason that in economic thought theory has so far predominated over quantitative research and the patient, difficult, and often disappointing working over of the available material.

But if, in the epoch under view, we find two well-marked periods profoundly disturbed by the dislocations of war demands and the devious devices of war finance, and, on the other hand, two periods in which these quondam abnormalities are lacking; and if then we find that the dominating forces and the sequence of events, the apparent causes and effects, were in each case essentially the same, we shall have at least some assurance that we are building upon a secure foundation.

Looking back over these sixty or seventy years we find distinct periods of what we may call marked prosperity and boom. The first of these, the era that followed our Civil War, was characterized by the rapid expansion of our railway system and the completion of the first trans-continental line; the opening up of wide areas of new and fertile land; another of the consequent "land booms" with which this country is so familiar; excited speculation; a violent rise in security and land values—in brief, an especial élan in the pioneering adventure which America has more or less represented almost from its beginnings.

There was another striking characteristic—a tendency to rising wages in contrast to declining commodity prices; in consequence, a widening disparity between workers' incomes and the cost of the commoner necessities of life, precisely such as we have witnessed since the close of the World War. It was not surprising, therefore, that, after the usual prattle as to the vast economic losses and exhaustions produced by the war, there should have arisen a numerous literature explaining all this and its attendant sequelae as "the advent of a new era," a revolution in industry, and the like—symptoms identical with the kindred literary effort which has become so familiar in our own time.

There ensued, as you know, an unhappy disillusionment, perhaps the worst or the most widespread industrial depression which this country had known up to that time, when land values fell vertiginously, security prices as well, and grass sprouted between the cobblestones of Wall Street. We may gauge the extent of the disaster when we note that a wide list of gilt-edged railway stocks, sold at the bottom of the panic of 1873, could have been repurchased in the still deeper depression of 1877 for one half the average selling price.

III

This post-Civil-War boom and collapse was, we know, repeated in an extraordinary degree in the twenty years that followed. The tremendous boom in the eighties ended in the panic of 1893 and, in the next four years, in a depression almost parallel to that of 1873–78. The renewed era of railway expansion of the eighties, involving the construction of ten or twelve thousand miles of railway within single years, with another of our prodigious land booms and town-lot speculations, was followed by yet another period of seemingly utter prostration.

Disillusionment widened. The literature of the time took on another hue. The new thought then was that these booms and depressions were the direct product of our new industrial order, that there was something inherent and inevitable in their sequence.

The likeness of time intervals, as between the panics of 1837 and 1857, of 1873 and 1893, and the intervening minor crises of 1843, 1847, 1877, 1884, and so on, was regarded as confirming this fatalistic view. Almost every known variety of influence was invoked, sometimes singly, sometimes in convocation, to "explain" this disastrous malady. The first Bureau of Labor report, for the year of 1886, by Carroll Wright, listed 180 of these supposititious "causes," for the most part as bizarre as they were futile.

So imbued was the thought of the period with the idea of definite time intervals that in 1912 the Russian, Tugan-Baranovsky, ventured to predict the advent of a similar disaster in 1914–16. But our own generation has seen no such recurrence of prolonged and grinding depression. We do not, of course, know that the outbreak of the World War did not forefend such a widespread stagnation as was seen in the nineties and the seventies.

But it is clear that the last thirty years have seen a marked amelioration. After the long battle over free silver and the final adoption of the gold standard by this country, the stage was set for another era of expansion, which came in the late nineties; and then, after a period of quiescence, came the war boom and its sequel, continuing to the present time. There was a sharp interruption from the banking and currency crisis in 1907, and again from the violent and world-wide collapse of prices in 1921. But each of these was followed, in this country at least, by a quick recovery.

It is not without interest that the phrase of "hard times," so widely prevalent in economic writings for several generations, has almost disappeared from the vocabulary of our own.

So the spell of the fateful time-interval which had so deeply colored the economic thought of the nineties gave way to the benign optimism

of the nineteen hundreds and to the reappearance of "the new industrial era" which had been the incantation of the eighties, and, before that, of the late sixties. The apprehensive may view with disquiet the perfervid iteration of this familiar hymn in the mushroom literature of the present time; and, unhappily, we cannot say that these are but the habitual reactions of the timid and strabismic. It is still given to no man to construct the orbit of his own time. The future is still in large measure veiled; and we may find that some of the confident anticipations of today have the same value as the famous predictions of bankers and experts that, from 1900 on, interest rates would long continue at very low levels.

Yet, if I mistake not, a definite gain in knowledge has been made. From the conflagration of the World War, statistical inquiry received a profound impulsion. Perhaps it required precisely such a vast economic upheaval to bring out the varied forces in clear relief. It is always the aberrations from the commonplace, the pathological side, as it were, which enable us to demarcate the forces which in their ordinary composition are so difficult to separate. In some sense one may say that the last fifteen years have provided the most fertile and fruitful, certainly the largest scale, laboratory experiment in economic theory that the human race has ever known.

It is not merely that the theater was so vast, the scenes so varied, the relationships often so sharply contrasted; it was the advent in this field of a new method, the statistical method—the careful recording of a vast number of numerical observations and the patient sifting and discussion of this wealth of new material. It is this, if I mistake not, which will differentiate economic investigation of the present from that of the past; that is, the replacement of theory and fantasy by the inductive methods of the physical sciences.

It is not that the method is so new or its vogue as yet so wide. Brilliantly begun by Jevons and others over two generations ago, it had already, before the war, made notable advances at the hands of Mitchell, Moore and Persons—to mention only a few of the workers in this country. But compared with the rapid accumulations in recent years the material available to pre-war workers was scant. It may be that a future time will say that it was with the remarkable outburst of statistical inquiry stimulated by and continued after the World War that economics as a science began.

IV

All this may be the part of over-optimism. Perhaps the same feeling has come to every period of highly quickened experience. Be this as it

may, I believe we have now reached, with at least tentative certitude, some conclusions on which the future may build. May I note certain of these which bear upon our present problem of the business cycle?

1. The evidence seems to be that the vast stream of directly consumable goods, that is, general trade, flows on with but little variation from year to year and decade to decade, save in its steadily swelling volume. To this stream of production and distribution of directly consumable physical goods we must add the vast body of non-physical contributions to our daily comforts, enjoyments and interests made by the physician, the lawyer, the journalist, and all their kindred, and those more tenuous forms of entertainment provided by the actor and the dramatist, the clergyman, the educator, the philosopher, and other purveyors to our thirst for knowledge, fiction, or fantasy.

This total body of direct consumability may make up, we may judge, something near 85 to 90 per cent of the total of our industrial or economic effort.

2. The wide variables in our economic and industrial effort belong, broadly, to the field of construction and of more or less permanent improvement; the extension of plants; the construction of dwellings; the creation of new roads and new means for swift communication, as the motor car, the aeroplane, the telephone, the radio; all of which have become an integral part of our present-day lives and a vital influence in our material, and perhaps also in our intellectual and philosophic, progress.

But the sum total of all this is as yet relatively small, and we may evaluate it at perhaps not much more than 10 or, at most, 15 per cent of the annual collective effort. It is in part the time interval elapsing between the initiation and the completion of these larger and more durable projects which gives to this element its greater variability.

3. Largely it is the high variability of this latter element which has given rise to the belief that business as a whole fluctuates widely, and vogue to the phrase "business cycles," or "trade cycles," as contrasted with, let us say, the idea of construction or building cycles. The rather unsatisfactory data we have as to factory and some similar forms of employment and the perversion of these data into misleading estimates of unemployment have also contributed to this belief. The evidence seems to be that, save after times of financial panic and credit collapse, as, for example, in 1920–21, the variations outside of factory and constructional employment are comparatively narrow.

4. These latter periods of financial and industrial disturbance seem largely due to a state of imbalance which appears to arise from a disparity between the growth of the volume of trade and production, on

the one hand, and the volume of credit on the other. I hesitate to add to this latter the volume or degree of savings, since this volume or degree seems as yet fraught with uncertitude.

On the other hand, one might well add a second important factor, namely, the balance between constructional activity and the growth in population, wealth and income of the country. But here, again, measurement and, more especially, long-term comparison seem difficult; and it is precisely this lack of adequate knowledge which at the present time makes evaluation of our economic situation so precarious.

Three of the four boom eras of which I have spoken followed directly upon a heavy accession of gold or some other basis for expansion and a corresponding increase in the credit volume, while the fourth came after the great inflation of the currency adopted as a means to carry on the Civil War, when the whole credit structure of the country was on a paper money basis. In the same way, the end of three of these eras which are now a part of history came with a distinct credit shortage and a financial paralysis resulting therefrom, while the fate of the fourth is as yet undecided.

There seems little doubt as to the general sequence of events, that is, first, the impetus to an unusual expansion of credit, followed by an unusual degree of constructional activity, which was carried on with only temporary interruptions as long as the credit supply was adequate. In each case this high industrial and constructional activity has been accompanied by a period of intense speculative activity which approached, at times, to a kind of national mania.

It seems not improbable that this seizure of the national mind has been one of the chief contributing causes to the disasters and disillusionments which followed. In the earlier periods this speculative fervor related more distinctly to land booms and to the building of railways, which in many cases gave rise to the booms. With the disappearance of great areas of unoccupied land and the diffusion of population over all of the habitable areas of the country, these great land booms, once so picturesque a part of our developmental history, have largely disappeared. They have given place to the eras of widespread industrial consolidation and excited speculation in the shares of these great corporate organizations.

V

Is history indefinitely to repeat itself? How far may this general sequence of events guide us as to what is to come? Does the economic history of the last sixty or eighty years really afford us a clue?

Many have taught, and we are accustomed to think, that our panics

and industrial crises extend far back; but this seems in part an illusion. The evidence appears to be that the panics of 1837 and 1857, and others preceding them, were not followed by years of grinding depression as were the crises of 1873 and 1893. Our industrial and financial organization had not in the earlier periods reached that degree of complex development which for a time seemed to make it so vulnerable to disturbances, both internal and external.

In Colonial days, and even into the earlier period of the Republic, the larger part of human needs and desires, the comforts and necessities of life, were the product of the immediate locale in which they were consumed. The average citizen was largely the taker of his own product. In the days of Washington and Jefferson the total volume of trade, while not negligible, was at least extremely small, if for no other reason than that means of transport of goods, save by water, were almost non-existent. It was distinctly with the unparalleled expansion of the means and speed of transport that the modern trade of the world, and therewith trade cycles and business cycles, took on a vital social import.

Today we may plot the curve of intensity of the business cycle and say that it began to show some rise with the advent of canals and turnpikes in the twenties and thirties; that it began to ascend rapidly in the forties and fifties with the prodigious burst of railway construction, and perhaps to reach its peak of intensity in the seventies, eighties and nineties, when the present geographical and industrial relationships of the nation were largely completed. Since then there has been a marked decline.

It is a matter of regret, for the study of economic affairs and especially of business cycles, that the World War should have come just when it did. We were deeply in need of yet another crucial test for the confirmation or modification of our theories. It is to be recalled that even as late as 1907 we had a sharp panic, markedly similar in many ways to that of 1884, and as brief and transient in its dislocations. What might have happened, then, after 1914, had there been no war?

The rapid increase in gold production seemed near an end. The world was coming to an almost universal use of gold as a monetary and credit standard. The absorption seemed nearly equal to the supply. In the four years preceding 1914 even so mercurial a measure of prices as the index of commodities at wholesale, so sensitive to every variety of disturbance, was almost at a standstill.

There was then no threatening overexpansion of credit; this was obvious because of the immobile state of the price barometer. There was no prodigious wave of railway building as in the eighties, or of huge

constructional activity such as we have seen in the last seven years. There was deep commotion at the ominous rise in the urban cost of living and the usual deluge of commissions of inquiry into what was perfectly obvious and well known. But otherwise the industrial state seemed oscillating like a damped pendulum. Would it have so continued? We do not know.

But for this country, at least, the procedure of events after 1914 was still along strictly classical lines—an overwhelming inflow of gold and a consequent expansion of bank credit unequaled since our Civil War; exactly the same violent rise in prices to, curiously enough, almost exactly the same degree; followed after the close of the war by a burst of constructional activity; and culminating—shall we say, in what appears to be, percentually, the greatest wave of stock speculation which the country has known.

Happily for the student of the economic spectacle there came with all this a parallel outburst of the statistical mania which has come, in the eyes of the foreigner, to be an outstanding trait of the American character. And this has given us a marvelous fund of information. Thanks to this, we may at least say a number of things, and perhaps, also, dispose of some idle ideas which have been widely prevalent.

We can see now that, despite the universal impression, the war did not make us rich; nor did gold and inflation make us rich. Neither did they make us poor. They seemed to have singularly little effect upon the nation as a whole—only upon individuals and classes of society. If we plot a curve of our industrial growth, of our gain in total product and manufacture, covering the last fifty or eighty years, and if, removing dates, we chop this up into equal pieces, as in a child's game, we find it difficult to pick out the war period. We find that it differed in no wise from other periods of marked expansion.

We now know that we have made no unparalleled gain in efficiency, either during the war or since. The impression of increased efficiency seems the illusion of every period of marked industrial expansion, and directly the product of our incorrigible thirst for bunk. The rate of our industrial growth, the gain from one decade to the next, seems not materially to have changed within the last sixty or eighty years. So far as the evidence is attainable, this rate of growth seems not to have varied widely from a long-term steady average of about 4 per cent per annum. In periods of boom it is a little higher; in the ensuing depression, a little less. We have been steadily growing richer and more efficient for at least a full century, and, taken over the larger intervals, at apparently an almost unchanging rate.

It is obvious that with the steadily declining rate of increase in

population this unchanging gain in total product has meant more and more from, and for, the individual, and must mean a steady rise in our comforts and enjoyments.

We have had a huge increase in our gold stock or, as I feel we may now begin to think of it, our gold *hoard*. But it has not been incomparable. We had an almost similar accession after we resolved definitely for the gold standard in 1896 and again, in the earlier period, when we determined upon the resumption of specie payments; perhaps, also, in the fifties, following the romantic discoveries in California and Australia.

From 1850 to 1861 our gold stock increased tremendously, from an almost negligible figure to 270 millions in 1861; from 1877 to 1888 it increased from 168 millions to over 700 millions, a gain of about 320 per cent; from 1896 to 1906, from 600 millions to nearly 1,500 millions, a gain of 150 per cent; and from 1914 to 1924, from around 1,900 millions to 4,500 millions, a gain of about 135 per cent. On these increases, in each instance, was posited a correspondingly heavy increase in the volume of bank credit; and with this, in each instance, a rapid and unusual gain in industrial and constructional activity.

Undoubtedly this sharp increase in industrial product was owing in part to the slack obtaining in the antecedent periods of depression and in part to the potent influence of the revival of construction. Also, in each of the three latest instances, namely, the late seventies, the late nineties, and again during and just after the war, there was a heavy gain in our nominal balance of foreign trade. This inevitably implied a nation that had been relatively importing less and exporting more, which in part also implied a nation that was spending less and saving more. But there seems little reason to question the dominant influence of the sharply augmented purchasing power due to the heavy accessions of gold and the new bank credit erected upon these accessions. Thus was the stage set for the boom periods which followed and, with the booms, the revival of frenzied speculation.

VI

Perhaps the greatest of economic riddles is why this accelerated tempo of industrial and constructional activity cannot be indefinitely maintained. But the larger aspects, at least, seem clear. We now know that there is a fairly fixed normal or usual rate of industrial expansion, depending upon the growth of population, invention, discovery, and improvement of methods of production. Superimposed upon this rate, from time to time, is the added impulse derived from more intense building activity, which feeds its own flame.

There is, always, a maximum amount of employment for any given period, and in proportion as the boom grows, therefore, there is a tendency to higher wages and greater spending power from all that part of the community directly affected. Following this is a demand for better housing, better shops, better transport facilities, and the like. Our scale of living seems distinctly to rise. And from this fact the feeling of well-being associated with periods of prosperity seems very largely derived.

This feeling is highly stimulated by the speculative rise in lands and urban property and, latterly, more especially in the share values of our great industrial enterprises. The large gain in the actual possessions of a great number of individuals gives rise to the illusion of a real and an unusual gain in national wealth and income.

But back of every such era apparently the most important factor always is the increased spending power derived from the expansion of the circulating medium, which, I need not say, in our own time is almost wholly a question of the expansion of bank deposits. This seems the primal condition for all booms. This is, if not the *vis primus*, at least the enacting clause of all undue expansion. I repeat here my favorite simile of the tethered cow. It may browse with freedom within the range of its rope, but expansion beyond this point is clearly conditioned by a lengthened tether. But this expansion has definite limits in its effects.

Perhaps the largest gain in our knowledge of credit phenomena, in recent years, has been the adequate proof of the relative inelasticity of business and trade in relation to the credit volume; that is, that unduly rapid expansion of credit and purchasing power can lead to only a very moderate increase in total production. When we reach the practical maximum of employment, it is obvious that further expansion of purchasing power can only lead, for the time being, to enhanced prices for the existing product or, as at the present, for land and securities. This fact is elementary, but is often lost from view.

On the other hand, in all boom periods, save that of the present, the amount of possible credit expansion has also soon reached the end of its tether. Periods of boom do not usually imply decreased imports and increased exports, that is to say, an augmented balance of foreign trade, but, as a rule, precisely the reverse. And as our actual international balance seems never to be very large, and as it is highly sensitive to the balance of spending and saving, the result has usually been an outflow of gold or its equivalent, or at least an inadequate inflow, with the usual recurrence of a credit stringency. This has meant a sharp check, if not to the broad stream of trade, at least to speculation and to those con-

structional activities which, as I have endeavored to make clear, are the main propellent forces making for what we call boom.

VII

If, now, we gather together the threads of the argument, what conclusion may we reach? We have seen that, historically, every period of unusual expansion or boom has been followed by a corresponding depression, and that the resulting rate of growth of our wealth and of our product in the whole period has been no greater than the average in more peaceful or normal times, when the boom spirit is absent. In other words, these boom periods, which we have come distinctly to associate with the idea of national prosperity, seem to represent in the end no clear national gain. Why, then, should we have them?

Years of unusual expansion are paid for by lean years of depression and unemployment, often involving widespread suffering. High hopes are brought low, fortunes are wrecked, and, worst of all, the business and economic morale of the nation seriously impaired. When fortunes can be made gambling in pieces of paper, of what utility or attraction are the antique virtues of industry, sobriety and thrift? These are temporarily thrown into the discard, reluctantly and discontentedly to be resumed when the house of cards has crumbled.

But, it may be urged, are these pleasant periods of excitement and exaltation to be done away with deliberately? Does any one seriously propose to check prosperity when it comes? Are not such waves of over-optimism characteristically a part of our exuberant temperament? Is it not precisely this exuberance, and the restless, aggressive spirit which goes with it, which has given to these United States today the industrial and perhaps now also the financial primacy of the world? In brief, shall there be no more cakes and ale?

The answer seems to be that the apparent gains of prosperity, or at least of boom, are largely illusory, and in so far as they are a reality have been, in the past at least, too dearly paid for. Clearly, true prosperity, that is, the general diffusion of comfort and well-being among the largest possible number of the population, is not dependent upon inflation and boom. Clearly, we do not need a debasement of the currency of exchange or a frenzied commotion of speculation in stocks to assure this condition of well-being. We have this amply at other times without the attachments of a champagne jag.

Moreover, there is always a considerable body of our population that barely lives within its income; prudence, economy, and self-denial are not universal virtues, and in great numbers of cases even these are of little avail against misfortune and deficient ability. In periods of

reversal and industrial depression this part of the population pays heavily for the over-confidence or reckless optimism, the high play of our captains of industry and finance. Is the game worth its price?

There is yet another side. There is evidence that these periods of boom and heavy gambling represent a distinct transfer of wealth and income from the many to the few, from the ignorant and imprudent to the pockets of the sagacious, the farsighted and the crafty. Always in such periods there is a vast number of wildcat flotations which bring incredible losses to the unwary.

The evidence seems to be that in these periods of speculation the number of incomes above, say, $50,000 rises with great rapidity, and the increase in these incomes runs far beyond the gain in the aggregate income of the country.

The income tax returns now reveal between thirty and forty thousand individuals with incomes equivalent to or exceeding that of a millionaire. Possibly half or more of these incomes have been created by the violent debasement in the value of the currency which has taken place since the beginning of the war. Only seven thousand individuals were so rated in 1914. A considerable part of the present number must be due, also, to the enormous rise in the value of securities since the war and to the colossal manipulation in security values, incomparably the greatest gamble the world has ever known.

Is the millionaire, *per se*, so desirable a type that our economic machinery should be geared thus to create them by the tens of thousands? Are we as a people happier, more contented, saner in spirit, less lost in the maelstrom of making money, because we may boast of twenty-five thousand new millionaires in the last decade? More than eighty years ago the greatest of our philosophers wrote of "great, intelligent, sensual, avaricious America." Must it ever so remain as Emerson felt it then?

The cynical may indeed suggest that this concentration of wealth and income, this filching from the many to enrich the few, is an agreeable means of expanding that fund of capital which is so necessary for our industrial growth; and that the greater the degree of concentration, the greater the eventual gain in national wealth. But on this plea we should be led to suggest, for example, that governmental lotteries are the most economical and least painful form of taxation. Nothing so highly stimulates thrift and self denial among the masses as the chance for fabulous gain which the lottery brings. The moralist might add that the human ape is largely spurred on to greater efforts by the illusive phantoms of hope and imagination, and that the greater rein we give to these qualities the greater the general enjoyment and content.

But the Puritan spirit which still dominates our national polity has suppressed the lottery, as it attempts, also, to suppress so many other of the pleasures of the flesh, the wine cup and the bay-leaf. Will it leave untouched what still remains our chief form of emotional intoxication and self-illusion? These are problems which we must leave, perforce, to the spirit which rules us, in the mournful assurance that nothing which the economist may offer will influence it in any way.

But if we may not change the American spirit, and still less attempt to regulate the movement of our vast industrial machine, can we do nothing at all? One thing of profound importance I think we may do. We have seen how closely our industrial expansion is bound up with the supply of capital and credit. In this capital supply, beyond question the high variable is bank credit. Other immediate sources of capital represent largely a conversion of funds from this primary source. What we term saving and thrift seem very largely constant forces. They rise with credit expansion and decline with its contraction. In the long run, of course, the amount of real saving may represent a nearly constant relationship to the real income and real product of the country. For the time being, at least, it is clearly augmented by inflation and depressed by deflation.

If, then, the augmentation of the credit supply is the vital factor, we have here what may well be an object of the most general concern, especially if, as seems true, this is in large measure subject to rational control. We have learned to measure the rate of our industrial growth. We may, likewise, measure the rate of credit expansion from year to year, and even month to month. Between the two exists the definite balance of which I have spoken.

The evidence now seems clear that an excess of the rate of credit expansion over the growth of production and trade results merely in the familiar forms of over-stimulation, inflation and speculation. If the rate of credit expansion falls below that of the normal gain in product, the result appears to be a crimping and contracting influence, bringing with it unemployment and a check to the normal growth.

The proof of this narrow relationship, this sensitive balance, seems to me the most important contribution which statistical investigation has made to economic theory, and its recognition as a working rule of banking and credit policy may prove the greatest gain which we have derived from our now centralized and unified banking system.

THE ACCURACY OF THE RECORDED BIRTH STATISTICS IN URBAN AND RURAL AREAS[1]

By Jean Downes, *Millbank Memorial Fund*

That the accuracy of birth rates as officially recorded for urban and rural populations may be affected by the procedure of allocating births to the place of birth instead of to the residence of the parents is thoroughly realized by the careful student of vital statistics. Without the necessary information—which can be obtained only by considerable labor—for proper correction of his data, he has had to be content, however, with the assumption that "non-resident" births occurring in a given area are balanced by the births of residents which occur outside of this area.

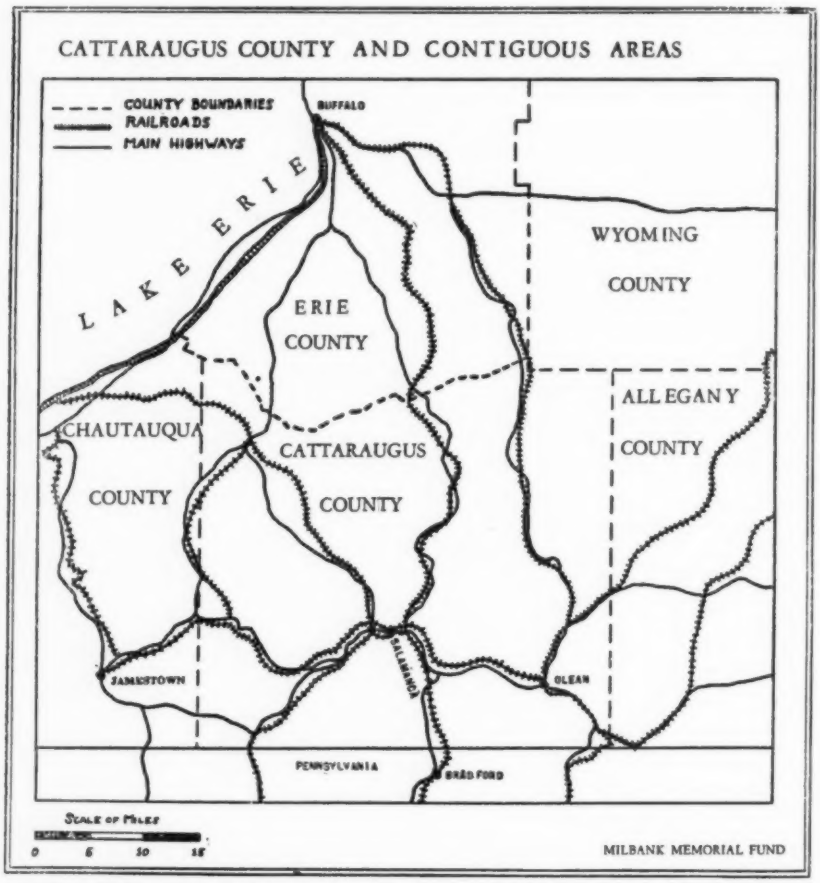
This comfortable reliance upon the virtue of averages is not shared by those who are in close touch with the original records. For example, local public health officials know that by reason of the increase in hospital facilities in urban centers and of the increasing proportion of maternity cases in hospitals, a larger number of births to non-resident mothers are occurring in towns and cities. Yet, in obedience to traditional procedure, these births continue to be allocated to the urban centers where the hospital is situated. The obvious result is an erroneous reduction in the number of births in rural areas and a spurious increase in urban births. Death rates from cancer and other diseases which require hospitalization are similarly affected. The same sort of scrambled statistics are found in the official urban and rural tuberculosis death rates, but with a contrary result since an increasing number of tuberculous persons are treated in sanatoria situated in rural territory.

The accuracy of birth rates is of especial importance now because of the renewed interest in factors involved in problems of population. We shall probably see many new statistical studies in the next few years dealing with natality data for different types of populations, localities, and areas, as well as other indexes of conditions that hypothetically or actually may affect population growth. With the more diffused knowledge of statistical technique there is reason to expect that the analysis of the officially recorded data will be properly refined. The question of the accuracy of the data themselves, however, clearly

[1] From the Research Division of the Millbank Memorial Fund. Acknowledgments are made to the Cattaraugus County Health Department, especially to Miss Frances King, statistician, for assistance in compiling the data, and to the Bureau of Vital Statistics, the New York State Department of Health, for access to birth certificates.

is fundamentally important and it is distinctly worth while to examine them with extreme care before they are subjected to statistical analysis.

As a small contribution to this essential step, the results of a study of the natality data for a representative county are presented in the following pages. The county is Cattaraugus, N. Y., in which an ex-



Map of Cattaraugus County showing the geographic location of urban centers within the county and the urban centers in the areas adjoining Cattaraugus County, with connecting railroads and principal highways.

periment in rural health administration has been in progress for the past six years. It was selected as typical for this purpose and may be so regarded for our use here. With a total population of about 70,000, it has two small cities—Olean, with approximately 20,000 inhabitants, and Salamanca, with approximately 10,000 inhabitants. The re-

mainder of the population—some 40,000—lives in the rural part of the county in which there are no towns or villages with more than 2,500 inhabitants, except the village of Gowanda, part of which is in Erie County. Cattaraugus County itself lies on the northern Pennsylvania boundary and is not far distant from Bradford, Pa., Jamestown, N. Y., and Buffalo, N. Y., which are urban centers.

Thus our study divides itself into two phases: the effect of correction for residence of mothers (1) upon the birth rate of the county as a whole and (2) upon the birth rate of urban and rural populations within the county. In both phases of the inquiry we are concerned primarily with two factors: (1) the geographical location of hospitals and (2) the increase of hospitalization of maternity cases. Our study is limited to the period beginning with 1916, since birth registration in New York State prior to that year was not sufficiently complete.

Considering first, then, the birth rate for Cattaraugus County as a whole, certain facts and data may be presented. Olean, the chief urban center, is situated near the southeast border of the county. The accompanying map shows that the location of Olean, because of means of communication such as railroads and highways, brings it into close proximity to a section of northern Pennsylvania and Allegany County. Salamanca is a smaller city with limited hospital facilities and, consequently, serves a more restricted area. On the other hand, it is quite apparent that urban centers such as Jamestown, in Chautauqua County, and Buffalo, in Erie County, are more easily accessible to many residents of certain sections of rural Cattaraugus County who desire hospital care.

Table I shows the number of non-resident births which were regis-

TABLE I

BIRTHS TO MOTHERS NOT RESIDENTS OF CATTARAUGUS COUNTY REGISTERED AT OLEAN

1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927
10	21	23	31	37	43	31	36	51	57	86	94

tered at Olean during the period 1916–1927. Approximately all of these births occurred in hospitals, and it is obvious that the number has manifested an increase sufficient to affect materially the birth rate of Olean as well as that of the county as a whole.

If births to non-resident mothers are to be excluded, it is necessary to ascertain the number of births to residents of Cattaraugus County which occurred in adjoining areas. Accordingly an examination of the

birth certificates of Allegany, Wyoming, Erie, and Chautauqua counties was made for the years 1916, 1920, 1925, 1926 and 1927. The birth certificates at Bradford, Pa., were examined also, since Bradford is the only large Pennsylvania city near the Cattaraugus County line. The births to mothers resident of Cattaraugus County which were secured from the outside areas are presented in detail in Table II. Practically all of these births occurred in hospitals.

TABLE II

BIRTHS TO MOTHERS RESIDENT OF CATTARAUGUS COUNTY WHICH OCCURRED IN SPECIFIC OUTSIDE AREAS, 1916, 1920, 1925, 1926 AND 1927

Year	Erie County		Chautauqua County		Allegany County	Bradford, Pa.	Total births secured from outside areas
	Buffalo	Total county	Jamestown	Total county			
1916	9	10	1	4	0	7	21
1920	10	11	0	1	5	4	21
1925	30	35	4	7	8	8	57
1926	24	26	9	11	10	9	56
1927	*	28	*	6	1	8	43

* Data not yet available.

It was considered that the years 1916, 1920, 1925, 1926 and 1927 would serve as a fair sample and that by using these years as a basis of estimation, a more accurate picture of the birth rate in Cattaraugus County might be presented.

The actual number of births to mothers who were residents of Cattaraugus County for the years 1916, 1920, 1925, 1926 and 1927 was secured and the resulting birth rates in these years were used as a basis for estimating the rates for the intervening years. The method of procedure was as follows: the births to mothers who were not residents of Cattaraugus County were excluded for the period 1916–1926. The birth rate computed from the net births results in a partially corrected rate. For the years 1916, 1920, 1925, 1926 and 1927, the total corrected birth rates were obtained by adding to the net births registered in the county those births to residents which occurred in the nearby areas. In the years for which resident births registered outside the county were not obtained, the partially corrected rates were multiplied by a factor obtained from the ratio of the final rate to the partially corrected rate for the years 1916, 1920, 1925, 1926 and 1927. The difference in the ratios of the rates in the known years was distributed arithmetically over the intervening years. For example, the final rate in 1920 was 1.4 per cent higher than the partially corrected rate and in

1925 was 4.3 per cent higher. The difference between these two percentages was distributed arithmetically over the five years.

TABLE III

BIRTHS AND BIRTH RATES IN CATTARAUGUS COUNTY AS REGISTERED 1916–1927
(Births to Indian Mothers Excluded)

Year	Rate per 1,000 population	Total births registered	Total population
1916	21.8	1,493	68,375
1917	20.4	1,409	68,932
1918	22.3	1,553	69,488
1919	20.9	1,464	70,045
1920	21.9	1,547	70,546
1921	23.3	1,652	70,996
1922	22.1	1,578	71,453
1923	20.1	1,442	71,907
1924	20.4	1,474	72,360
1925	19.6	1,425	72,814
1926	19.3	1,417	73,267
1927	19.3	1,424	73,720

Table III shows the total recorded births and birth rates for Cattaraugus County. Table IV presents the number of births and birth rates which resulted from each step in the process of correcting for non-

TABLE IV

CATTARAUGUS COUNTY BIRTH RATES AFTER DEDUCTING BIRTHS TO NON-RESIDENT MOTHERS, ALSO TOTAL CORRECTED BIRTH RATES AND ESTIMATED TOTAL BIRTH RATES

Year	Total registered births	Number of births to non-resident mothers	Number of births in county to resident mothers	Birth rate in county to residents	Number of births outside county to residents *	Total known births to residents	Total corrected birth rate	Estimated total birth rate †
	(1)	(2)	(3)=(1−2)	(4)	(5)	(6)=(5+3)	(7)	(8)
1916	1,493	17	1,476	21.6	21	1,497	21.9	....
1917	1,409	28	1,381	20.0	..	.....	....	20.3
1918	1,553	28	1,525	21.9	..	.....	....	22.2
1919	1,464	35	1,429	20.4	..	.....	....	20.7
1920	1,547	50	1,497	21.2	21	1,518	21.5	....
1921	1,652	64	1,588	22.4	..	.....	....	22.8
1922	1,578	43	1,535	21.5	..	.....	....	22.1
1923	1,442	46	1,396	19.4	..	.....	....	20.0
1924	1,474	62	1,412	19.5	..	.....	....	20.2
1925	1,425	70	1,355	18.6	57	1,412	19.4	....
1926	1,417	99	1,318	18.0	56	1,374	18.8	....
1927	1,424	110	1,314	17.8	43	1,357	18.4	....

* Births to residents registered outside the county include births registered in Chautauqua, Erie, Allegany Counties and Bradford, Pa.
† Ratio of total rate (Column 7) to partially corrected rate (Column 4) in same year used as a basis for estimating rates in intervening years.

residence. Column 2 gives the number of births to non-resident mothers which were excluded from Cattaraugus County. It is interesting to note that these numbers increase during the entire period and

that there is a very marked increase in 1924, 1925, 1926 and 1927. Column 5 shows the number of births to residents of the county which were secured from nearby areas, and a somewhat similar increase is noted in 1925 and 1926. Column 7 shows the corrected birth rates and column 8, the corrected birth rates as estimated for the intervening years.

Although correcting the birth rate for non-residents resulted in a slightly higher rate for Cattaraugus County in 1916, the general result

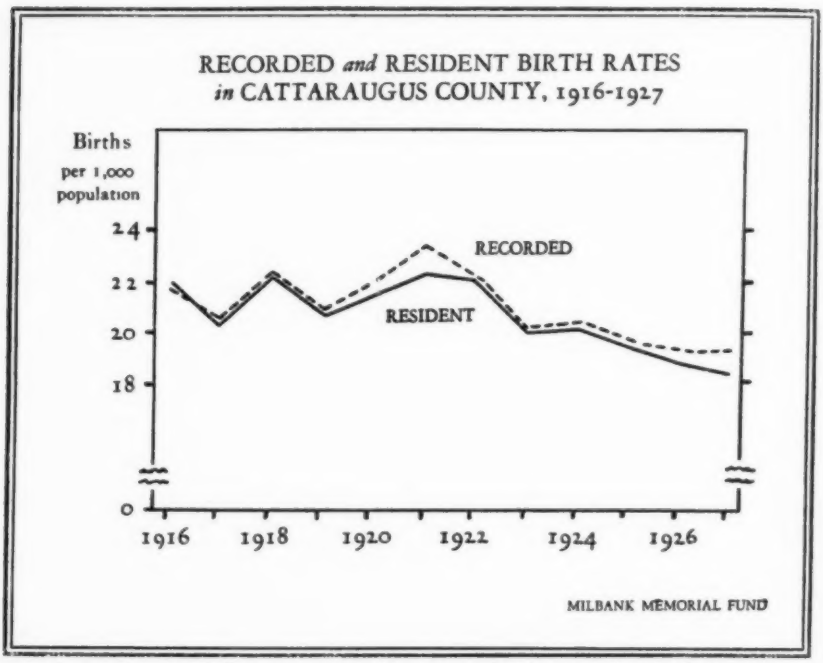


FIGURE 1.—Officially recorded birth rates per 1,000 population in Cattaraugus County and the resident birth rates which have been obtained by the exclusion of births to non-resident mothers occurring in the county and the inclusion of births to Cattaraugus County mothers registered in nearby areas, 1916–1927.

is a reduction in the official birth rate with the exception of 1922, for which year the corrected and uncorrected rates are the same. These differences are shown graphically in Figure 1. Judging from the divergence in the lines in 1924, 1925, 1926 and 1927, the effect of non-residents upon the birth rate is becoming increasingly important, owing to the fact that the number of non-resident births registered in Cattaraugus County, chiefly at Olean, has increased more rapidly than the number of births to Cattaraugus County residents in other areas.

The result of the correction of the birth rates for residence is most striking in the urban and rural areas of Cattaraugus County. As shown in Table V, the urban area has a most favorable recorded rate,

TABLE V

RECORDED BIRTH RATES IN URBAN AND RURAL CATTARAUGUS COUNTY, 1916–1927

(Births to Indian Mothers Excluded)

Year	Rate per 1,000 population		Number of births		Population estimated July 1	
	Urban	Rural	Urban	Rural	Urban	Rural
1916	25.4	19.6	676	817	26,639	41,736
1917	24.9	17.4	687	722	27,537	41,395
1918	27.3	19.0	775	778	28,434	41,054
1919	25.2	17.8	738	726	29,332	40,713
1920	25.4	19.3	761	786	29,914	40,632
1921	27.5	20.1	831	821	30,173	40,823
1922	25.4	19.6	773	805	30,441	41,012
1923	23.7	17.3	728	714	30,705	41,202
1924	24.6	17.2	762	712	30,968	41,392
1925	25.0	15.5	781	644	31,232	41,582
1926	25.9	14.4	816	601	31,495	41,772
1927	25.7	14.5	817	607	31,758	41,962

for not only is it high throughout the entire period from 1916 to 1927, but it steadily increased during the years 1923–1926. On the other hand, from 1916 to 1927 the recorded rural birth rate is much lower than the recorded urban rate, and from 1921 to 1927 there is a marked decline. The differences in the urban and rural rates are so great that they cannot be accounted for by the more favorable age distribution of women in the urban areas.[1]

To establish what were the actual birth rates for the urban and rural areas of Cattaraugus County, the births were allocated to the place of residence of the mother. After births to mothers who were non-residents of the county were eliminated, as shown in Table VI, column 2, an examination of the figures in column 5 clearly indicates that the births to women whose residence was in the rural area, but whose births were registered in urban areas, are sufficient to increase materially the urban birth rate. Column 8 brings out the fact that by far the majority of the births which were registered outside Cattaraugus County were births to mothers whose place of residence was in the rural area. When the urban and the rural birth rates are corrected as far as we can, they present a new aspect (columns 10 and 11), as the annual figures in Table VII show.

[1] In 1920 women aged 15 to 44 were 23.6 per cent of the total urban population and 20.3 per cent of the total rural population. In 1925 women in the same age group formed 24.3 per cent of the total urban population and 20.3 per cent of the total rural population.

TABLE VI

BIRTH RATES IN URBAN AND RURAL CATTARAUGUS COUNTY AFTER DEDUCTING BIRTHS TO NON-RESIDENT MOTHERS AND ALLOCATING BIRTHS ACCORDING TO USUAL RESIDENCE OF MOTHER, ALSO TOTAL CORRECTED RATES AND ESTIMATED RATES, 1916–1927

Year	Total births registered *	Births to mothers not residents of Cattaraugus County	Births to mothers residents of other parts of Cattaraugus County	Births to residents registered at place of birth (1)—(2+3)	Births to residents registered in other localities	Total corrected births allocated within county (4+5)	Partially corrected rate per 1,000 population	Births to residents registered outside Cattaraugus County †	Total known births to residents of specified area		Estimated birth rate ‡
									Number of births 9=(6+8)	Rate per 1,000 population	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Urban §											
1916	676	11	11	654	4	658	24.7	7	661	25.0	....
1917	687	23	5	659	1	660	24.0	..	...	....	24.2
1918	775	24	27	724	1	725	25.5	..	...	....	25.7
1919	738	32	27	679	1	680	23.2	..	...	....	23.3
1920	761	38	30	693	3	696	23.3	3	699	23.4	....
1921	831	54	45	732	1	733	24.3	..	...	....	24.5
1922	773	36	63	674	1	675	22.2	..	...	....	22.4
1923	728	39	55	634	2	636	20.7	..	...	....	21.0
1924	762	57	62	643	2	645	20.8	..	...	....	21.1
1925	781	59	86	636	1	637	20.4	12	649	20.8	....
1926	816	91	94	631	2	633	20.1	10	643	20.4	....
1927	817	95	99	623	2	625	19.7	5	630	19.8	....
Rural											
1916	817	6	4	807	11	818	19.6	14	832	19.9	....
1917	722	5	1	716	5	721	17.4	..	...	....	17.7
1918	778	4	1	773	27	800	19.5	..	...	....	19.9
1919	726	3	1	722	27	749	18.4	..	...	....	18.8
1920	786	12	3	771	30	801	19.7	18	819	20.2	....
1921	821	10	1	810	45	855	20.9	..	...	....	21.6
1922	805	7	1	797	63	860	21.0	..	....	....	21.8
1923	714	7	2	705	55	760	18.4	..	...	....	19.2
1924	712	5	2	705	62	767	18.5	..	...	....	19.5
1925	644	11	1	632	86	718	17.3	45	763	18.3	....
1926	601	8	2	591	94	685	16.4	46	731	17.5	....
1927	607	15	2	590	99	689	16.4	38	727	17.3	....

* Births to Indian mothers excluded.

† Births to residents registered outside the county include births registered in Chautauqua, Erie, and Allegany Counties and Bradford, Pa.

‡ Ratio of total rate (Column 10) to partially corrected rate on same year (Column 7) used as a basis for estimating rates in intervening years.

§ Urban includes towns 10,000 or more, namely, Olean and Salamanca.

The magnitude of correction of the urban rates increases throughout the twelve-year period, the difference between the corrected and the uncorrected rates being especially marked in the years 1924, 1925, 1926 and 1927. On the other hand, correction for residence raises the birth rates for the rural area, especially in 1924, 1925, 1926 and 1927.

Obviously the increase in hospital facilities and the hospitalization of maternity cases are becoming such important factors that they can no longer be ignored if a more accurate birth rate for urban and rural areas

TABLE VII

CORRECTED AND UNCORRECTED BIRTH RATES IN URBAN CATTARAUGUS COUNTY, 1916–1927.

Year	Uncorrected urban birth rates	Corrected urban birth rates	Percentage decrease caused by correction
1916	25.4	25.0	2.4
1917	24.9	24.2	2.8
1918	27.3	24.7	5.9
1919	25.2	23.3	7.5
1920	25.4	23.4	7.9
1921	27.5	24.5	11.0
1922	25.4	22.4	11.8
1923	23.7	21.0	11.4
1924	24.6	21.1	14.3
1925	25.0	20.8	16.8
1926	25.9	20.4	21.3
1927	25.7	19.8	23.0

is to be obtained. Figure 2, which presents graphically the results of allocating births to the place of residence of the mother, in urban and rural areas, bears out this conclusion.

TABLE VIII

CORRECTED AND UNCORRECTED BIRTH RATES IN RURAL CATTARAUGUS COUNTY, 1916–1927.

Year	Uncorrected rural birth rates	Corrected birth rates	Percentage increase caused by correction for non-residents
1916	19.6	19.9	1.5
1917	17.4	17.7	1.7
1918	19.0	19.9	4.7
1919	17.8	18.8	5.6
1920	19.3	20.2	4.7
1921	20.1	21.6	7.5
1922	19.6	21.8	11.2
1923	17.3	19.2	11.0
1924	17.2	19.5	13.4
1925	15.5	18.3	18.1
1926	14.4	17.5	21.5
1927	14.5	17.3	19.3

As a further step in ascertaining a more accurate birth rate for urban and rural areas in Cattaraugus County, the birth rates have been refined by using, as population, the women aged from 15 to 44 years. In Table IX are given the rates both for the officially recorded births and for the births after allocation to place of residence of the mother. These rates are shown graphically in Figure 3. The corrected rates bring out two interesting indications which are opposed to those shown by the uncorrected rates: (1) from 1921 to 1927 the rural area has had a higher birth rate than the urban, (2) the urban birth rate has shown a continuous decline during the entire period 1916–1927, while the rural rate has been declining only since 1922.

If we may consider Cattaraugus County as a typical area, it is interesting to compare its experience with that recorded for urban and rural New York State. Table X gives birth rates for urban and rural New York State compared with the resident birth rates for urban and rural

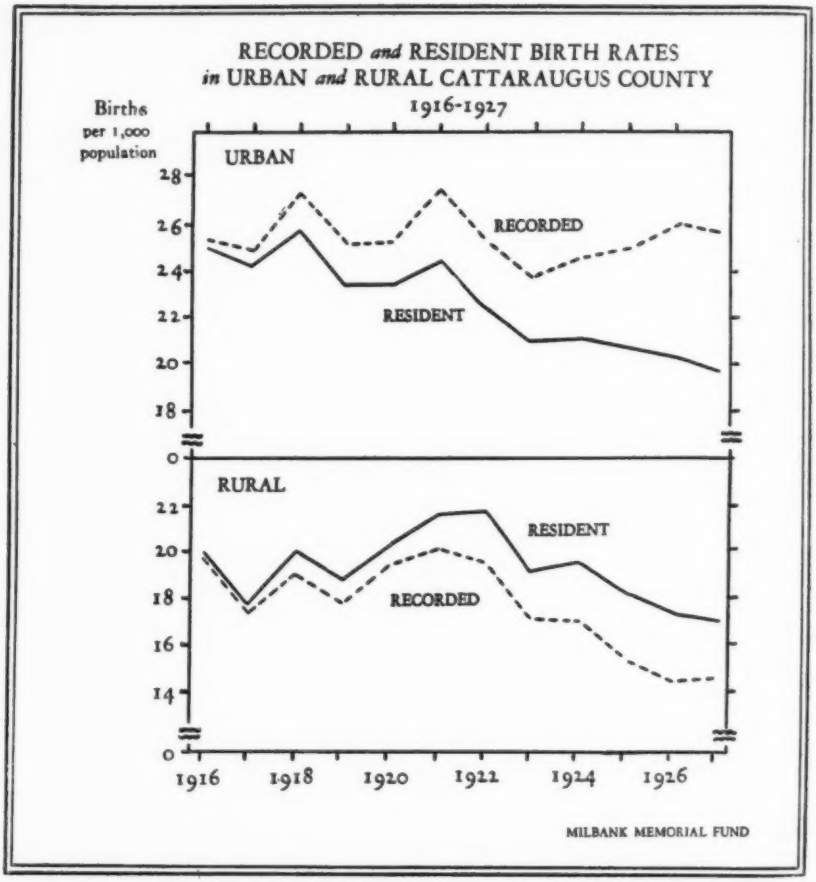


FIGURE 2.—Officially recorded birth rates per 1,000 population in urban and rural Cattaraugus County compared with the birth rates obtained by allocation of births to residence of mother within the county after exclusion of non-resident births and inclusion of births to Cattaraugus County mothers registered in adjoining areas, 1916–1927.

Cattaraugus County. The rates are plotted in Figure 4. During the period 1916–1924 the comparative levels of the urban and rural birth rates in New York State and Cattaraugus County are similar. In 1925, 1926 and 1927 the birth rate for rural New York State declined

TABLE IX

CORRECTED * AND OFFICIALLY RECORDED BIRTH RATES PER 1,000 WOMEN AGED 15–44 IN URBAN AND RURAL CATTARAUGUS COUNTY, 1916–1927

Year	Corrected		Uncorrected	
	Urban †	Rural †	Urban	Rural
1916	105.8	98.2	105.7	97.9
1917	102.5	87.0	104.0	87.2
1918	108.8	97.9	113.6	94.8
1919	98.8	92.5	104.8	89.2
1920	99.0	99.3	106.0	96.7
1921	103.2	106.4	114.7	100.6
1922	93.7	107.3	105.8	98.1
1923	87.4	95.1	98.8	86.7
1924	87.8	96.3	102.5	86.0
1925	85.5	90.4	104.2	77.4
1926	84.0	86.2	108.0	70.3
1927	81.6	85.3	107.2	69.0

* Births allocated to residence of mother.
† The number of women aged 15–44 according to the 1925 Census was 7,589 in urban and 8,441 in rural Cattaraugus County.

sharply to a rate similar to the recorded rate of Cattaraugus County. Although the urban rate for New York does not show an increase in these years corresponding to that in the recorded rates for Cattaraugus

TABLE X

RECORDED BIRTH RATES IN URBAN AND RURAL NEW YORK STATE COMPARED WITH RESIDENT URBAN AND RURAL RATES IN CATTARAUGUS COUNTY, 1916–1927

Year	Rate per 1,000 population			
	New York State		Cattaraugus resident rate ‡	
	Urban *	Rural †	Urban	Rural
1916	25.6	18.7	25.0	19.9
1917	26.3	18.1	24.2	17.7
1918	25.8	17.7	25.7	19.9
1919	23.4	16.0	23.3	18.8
1920	23.8	19.1	23.4	20.2
1921	23.7	20.6	24.5	21.6
1922	22.0	20.5	22.4	21.8
1923	22.1	19.8	21.0	19.2
1924	22.2	20.5	21.1	19.5
1925	22.2	16.0	20.8	18.3
1926	21.4	14.9	20.4	17.5
1927	21.2	14.8	19.8	17.3

* Exclusive of New York City.
† Includes localities with less than 10,000 population.
‡ Corrected for non-residents 1916, 1920, 1925, 1926 and 1927 with estimated rates for intervening years.

County, the decline evident in earlier years has been halted. But judging from the corrected rates for Cattaraugus County, it seems very probable that the birth rate for urban New York actually has continued

its decline, and that at least some part of the apparent decline in the rate for rural New York State is owing to the registration in urban communities of births to rural mothers.

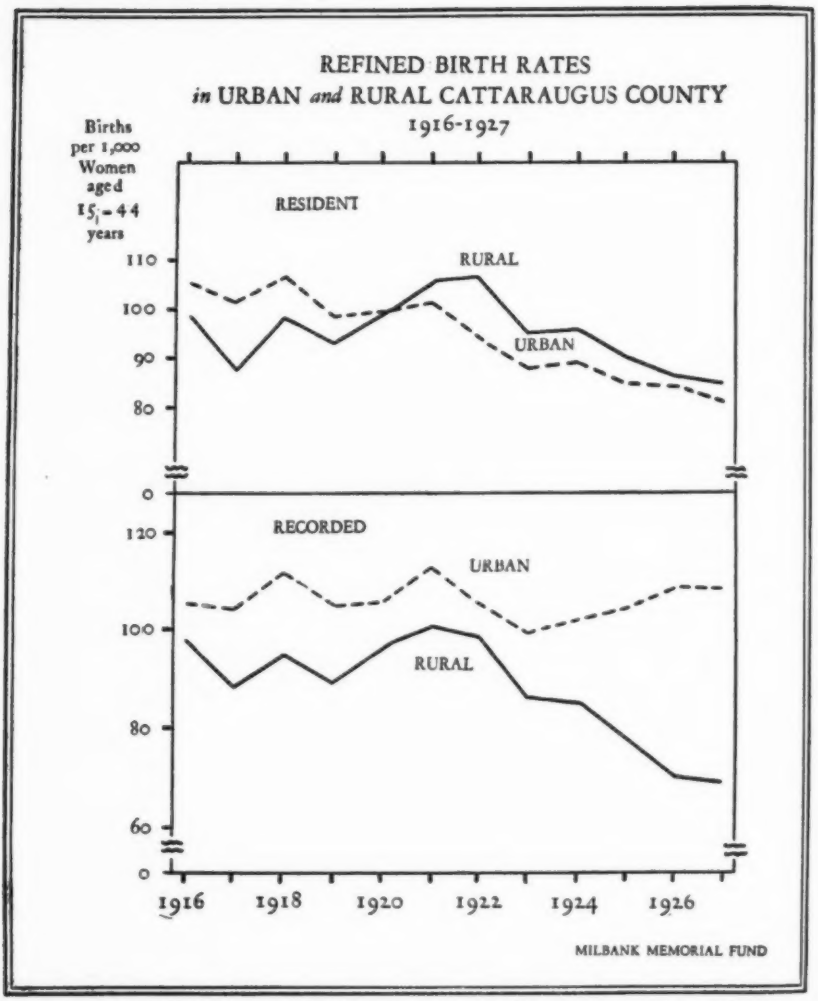


FIGURE 3.—Officially recorded birth rates per 1,000 women aged 15–44 years in urban and rural Cattaraugus County compared with refined birth rates based on births to resident mothers occurring in the county and in nearby areas, 1916–1927.

This experience in a fairly typical county emphasizes the necessity for a careful consideration of the factor of residence of mother before the officially recorded birth rate of a given locality is accepted. In fact,

if our results are confirmed by further studies in other areas, the desirability of revising the present procedure of allocating births according to locality ought to be given serious attention.

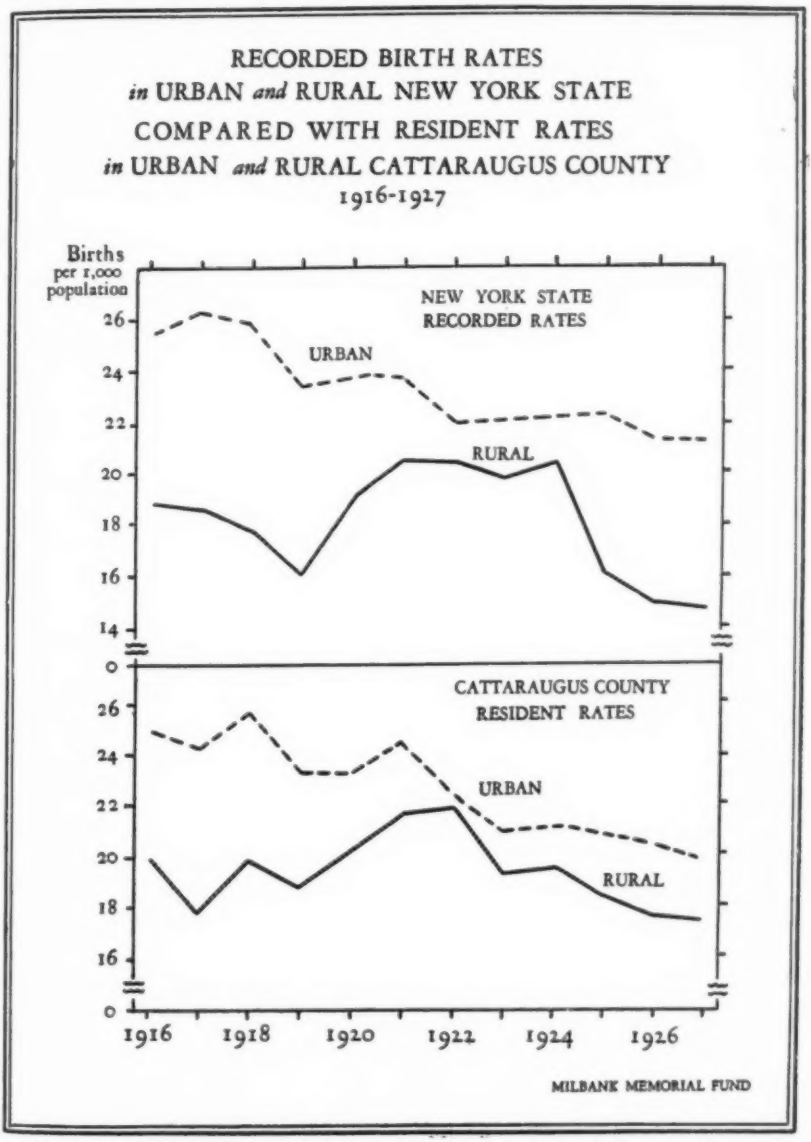


FIGURE 4.—Officially recorded birth rates per 1,000 population in urban and rural New York State compared with birth rates in urban and rural Cattaraugus County which have been corrected for residence of mother, 1916–1927.

CAN BUDGET AND COST-OF-LIVING STUDIES BE USED AS AIDS IN DETERMINING A DIFFERENTIAL WAGE?[1]

By Asher Achinstein

Agencies whose task it is to fix rates of pay for labor are often urged to recognize not only changes in the so-called general cost of living, but also the *geographical* differences in costs which it is claimed are characteristic of a country as diversified economically as the United States. Such a plea for differences in remuneration for the same grade of employee in various sections of the country frequently has been directed to the federal government. Then, too, in those industries where collective agreements between representatives of employers and representatives of employees are the basis for establishing a wage structure, the principle of allowing for differences in cost of living is sometimes used, although more often it is a subterfuge for recognizing the relative bargaining strength of the contending parties in the different districts. Finally, variations in costs are stressed by many business firms as a justification of the practice of paying lower wages in their sections of the country than rival concerns located elsewhere. While the chief purpose of this paper is to examine the statistical basis for the view that an equitable national wage policy demands an equality in the real wages of employees all over the country who are performing the same kind of work, it will touch, indirectly perhaps, upon the statistical adequacy of the contentions of the other groups.

The conclusion that budget and cost-of-living studies such as those published by the United States Bureau of Labor Statistics—and this source has been used because its materials are the most comprehensive for the present purpose—*cannot be employed for establishing a differential wage* may seem obvious in view of the fact that the most recent elaborate collection of family budgets was made ten years ago. The discussion, however, is based on grounds other than that the materials are not up-to-date. Perhaps something more than insufficient funds has prevented the Department of Labor—the stepchild of unsympathetic administrations in Washington—from analyzing the statistical data[2] obtained from an investigation as extensive as was the one

[1] A large part of this analysis was made for the Personnel Classification Board which was authorized by Congress to make recommendations on wage policy with reference to the federal employees in the field service.

[2] Some interesting experiments with these data gathered by the Bureau of Labor Statistics in 1919 were made by Prof. William F. Ogburn and were published in the *Monthly Labor Review* of August and September, 1919.

conducted in 1919. The department has probably been deterred as much by the difficulty of interpreting the results. That erroneous conclusions are likely to follow such attempts in a realm where practice often lags behind precept, is to be seen in a recent volume of the National Industrial Conference Board.[1] This organization, which is responsible for some of the most valuable discussions on the limitations of measurements of cost of living, concludes its latest publication with the statement that there is little difference between the various cities (in the East) in maintaining that metaphysical entity, a "fair American standard of living." [2]

We will first proceed on the assumption that the budget studies measure fairly accurately differences in costs in order to find out the size of the geographical differences. The validity of this assumption will then be examined. After that, the indexes of cost of living will be analyzed.

The Department of Labor gathered data on expenditures for food, clothing, rent, etc., from 2,562 "normal families" in 1890, from 11,156, in 1901, and from 12,837, in 1918.[3] All three investigations were undertaken when industry was in the so-called phase of prosperity. These three studies were comparable, then, in that the family budgets were collected at times when most of the principal bread-winners were receiving their pay envelopes quite regularly. It is true that the crucial point is, first, whether a sufficiently large number of samples was gathered in particular communities to make them representative of the actual costs of living of the industrial wage-earners in those sections; and, secondly, whether the same type of family was sampled in all three investigations. Such doubts are being postponed for the moment.

To measure the absolute differences in costs in the various parts of the country, the tabulations of Dr. Emma A. Winslow were used.[4] Expenditures for food, clothing, rent, etc., in 1901 are presented for 32 states; the 1918 investigation furnishes data on expenditures for 92 cities. Dr. Winslow has converted the figures of individual cities in 1918 into average expenditures per family per state for 42 states.

The average expenditures per family per state were grouped geographically in 1901 and 1918, and averages were obtained. In 1901

[1] This investigation of the National Industrial Conference Board differs from those conducted by the Bureau of Labor Statistics in being a *minimum-quantity-budget* study. The former establishes at the outset the standard of living that is under investigation and then obtains the prices of the items of the standard budget in various places; the latter attempts to reflect the variations in the amounts of money spent by wage-earning families in different localities—a procedure that postpones to the very end the troublesome question of the significance of the figures as defining differences in standards of living.

[2] *Cost of Living in Twelve American Cities*, p. 52.

[3] For definitions of "normal families" see *Purchasing Power of the Consumer*, by Berridge, Winslow and Flinn, pp. 133–134.

[4] *Ibid.*, p. 268, *et seq.*

the Western and North Atlantic States were highest, followed by the North Central States, and the South Atlantic and South Central States were the lowest. In 1918 the North Atlantic States were highest once more and, if we lump the South Atlantic and South Central States, the South proved again to be the lowest. It should be mentioned, however, that the average for the South Atlantic States was higher than that for the North Central States. Of considerable importance is the fact that the range within geographical divisions was greater than the differences among them. In other words, the averages representing the geographical divisions showed in most cases much less difference than did the averages for the states within each region.

In this connection it is interesting to see whether the communities which showed relatively low or high costs at one period maintained approximately the same relative positions at a much later period. The average expenditures per family for each of the 32 states were ranked according to size in 1901 and 1918. If most of the states did not shift their places more than four points on a scale of thirty-two, it would appear that the result was more than a matter of "pure" chance. It would seem that there were perhaps basic economic and sociological forces which produced this relative constancy. This method gives a state a maximum range of movement of 25 per cent, for it may change its position four points in either direction in the two periods. Nine out of the 32 states, or about 28 per cent of the total, maintained a position in the two years which did not shift more than 25 per cent. This group, ranked according to the size of the average expenditures per family, is made up of Georgia, Tennessee, Alabama, New Hampshire, Pennsylvania, Illinois, New Jersey, New York, and Washington. This seems to point to the conclusion that those states which maintained a fairly "constant" position in the two years fell into two different divisions of the scale. The average expenditures per family for the Southern States was lower than the average expenditures per family for the Northern States.

The 1890 investigation was included in the comparison to see whether there was the same cleavage between the North and the South. The average expenditures per family for 23 states in 1890, 1901, and 1918 were ranked. There were six states, a little over 25 per cent of the total number, whose position did not vary more than three points in either direction, or about 25 per cent, in the three years. These states, ranked from lowest to highest, were: Georgia, Tennessee, Rhode Island, New Hampshire, New York, New Jersey, and Illinois.

What these facts show, then, is that there were a few states in the South that manifested relatively low family expenditures, and a some-

what larger number in the North that consistently showed high family expenditures. Most states, however, showed no consistency in their behavior in the three periods. It is quite possible that more "normal" years as well as samples of a more comparable size would have produced a picture of greater stability.

When the question is raised as to the significance of these averages, the geographical differences seem to contain little meaning. In the first place, a varying number of states was included in each division and the number of budgets differed considerably from one region to another. Secondly, of greater importance than the differences in the size of sample is the kind of selection that was made within each city. One cannot examine the returns of the 1919 investigation without coming to the conclusion that the differences in the averages of family expenditures shown by many of the 92 cities were largely the result of the relative proportion of the income groups selected. When the agents were instructed that "families taken should represent proportionally the wage-earners and the low- and medium-salaried families of the locality," room was left for a fairly wide choice. The differences in the averages are largely measures of the variations in the judgments of the agents. In other words, the proportion of the budgets falling within the $900–$1,200, $1,200–$1,500 groups, etc., depended to a considerable extent upon the selection of the agent who covered the given district.

This argument appears to have less force in the case of the averages representing the geographical divisions. When the figures showed that the average for the South was lower than for the North or the West, is it not reasonable to assume that the agents in the South selected a larger proportion of the lower income groups because they were typical of the conditions in this section of the country? One may admit that differences in judgment will account for variations in the averages of a number of localities, but it is very unlikely that such bias will explain the differences in the broad geographical areas.

Admitting that these figures are descriptive of the reality, in the sense that less was spent on the average by families in one part of the country than in another, we still remain in the dark as to the meaning of this phenomenon. We are ushered into the nebulous field of "standards of living"—a subject which can furnish very little comfort to those bent upon establishing a differential wage.

Let us turn now to the third phase of our problem, namely, the rôle of index numbers in carrying out a differential wage policy. It is likely that periodic revisions in the differentials will become necessary to keep pace with the changes in cost of living. For administrative purposes it

is necessary to find out the extent to which there is a consistency in the behavior of the prices of the commodities and services which the wage-earners in different localities purchase.

The United States Bureau of Labor Statistics publishes three groups of figures of cost of living. There are indexes for the United States as a whole from 1913 to date that were published first annually, later semi-annually, then quarterly, and now, semi-annually. The total cost of living index is a combination of the prices of food, rent, clothing, etc., gathered in 32 cities. Separate indexes are published for 19 cities, expressed as percentages with December, 1914, as a base. Thirteen other cities have index numbers constructed with December, 1917, as a base. Apparently, then, the percentage of increase or decrease in cost of living in one of the 13 cities cannot be compared with the percentage change in one of the 19 cities because the changes in cost of living in the latter city are compared with the costs in the last month of the year 1914. This difficulty can be overcome, however, by converting the cost of living of the United States in terms of any base year with which it is desired to make comparisons if its quarterly or semi-annual indexes are divided by the index number which stands for the new base. The percentage of increase or decrease each in the 19 cities can thereby be compared with the changes in the total figures representing the country as a whole. Furthermore, if the index numbers of total cost of living, which were constructed with the average of 1913 as a base, are converted into a series expressed as relatives of December, 1917, the changes in cost of each of the 13 cities can also be compared with the indexes representing the country as a whole.

The following methods were employed to establish the proposition as to whether indexes of cost of living in different localities maintained a similar rate of change: The indexes for each of the 19 cities were compared with the indexes for the country as a whole, for each year, half-year, or quarter, beginning with 1917 and ending with 1927, by computing the percentage increase or decrease of the index representing the individual city from the index representing the total cost of living. In other words, the indexes for the individual cities were expressed as percentage deviations from the secular trend, which in this case is the total index of cost of living. All the percentage deviations for each city were then averaged. The same procedure was followed in the case of the 13 cities, except that this time the indexes for the individual cities were compared with the total indexes which were now expressed as relatives with December, 1917, as a base.[1]

[1] The method employed assumes that the total cost of living for the 13 cities would have increased from 1914 to 1916 at the same rate as the total cost for the 19 cities. It should also be noted that in

Table I presents the averages of the deviations from secular trend, ranked according to size for "All items." The total range between the cities having the lowest and highest percentages was from −6.4 per cent for Portland, Oregon, to +8.1 per cent for Detroit, Michigan—a range of 14.5 per cent from the base line. This table includes also the average deviations of the changes in the prices of food, rent, and

TABLE I

RANKING OF AVERAGE DEVIATIONS OF CHANGES IN COST OF LIVING AS WELL AS FOOD, RENT AND CLOTHING OF THIRTY-TWO CITIES, DECEMBER, 1917–1927 *

City	Rank	All items (1)	Rank	Food (2)	Rank	Rent (3)	Rank	Clothing (4)
Portland, Ore.	1	−6.4	2	−5.3	10	−10.9	4	− 7.5
Birmingham	2	−4.7	12	−2.0	21	+ 2.8	1	−12.4
San Francisco and Oakland	3	−4.4	9	−2.9	2	−16.3	28	+ 9.9
Richmond	4	−4.2	11	−2.4	3	−15.7	10	− 3.1
Atlanta	5	−3.5	15	− .9	17	− .5	3	− 8.6
Kansas City	6	−3.1	5	−3.0	13	− 6.2	12	− 1.0
Minneapolis	7	−2.8	19	+1.4	7	−12.5	5	− 7.1
Savannah	8	−2.7	1	−8.2	12	− 7.4	25	+ 5.2
Cincinnati	9	−2.7	14	−1.0	6	−12.8	8	− 6.9
Washington, D. C.	10	−2.5	32	+6.2	5	−14.3	20	+ 2.7
Mobile	11	−1.8	18	+1.2	11	− 9.2	2	−11.1
St. Louis	12	−1.4	13	−1.7	23	+ 4.3	7	− 5.4
New Orleans	13	−1.3	6	−3.8	14	− 5.8	14	+ .9
Memphis	14	− .9	3	−5.2	20	+ 2.2	6	− 6.8
Indianapolis	15	− .8	16	− .3	8	−12.1	9	− 4.1
Portland, Me.	16	− .6	29	+5.6	1	−19.0	13	+ .6
Denver	17	− .5	7	−3.8	28	+10.0	15	+ .9
Boston	18	+ .5	20	+1.6	9	−11.8	29	+11.8
Seattle	19	+ .7	4	−4.8	27	+ 8.4	17	+ 1.7
Pittsburgh	20	+ .9	17	+ .7	18	0.0	11	− 1.5
Houston	21	+2.3	26	+4.0	4	−15.1	31	+13.9
Scranton	22	+2.5	24	+3.4	15	− 4.0	22	+ 4.2
Chicago	23	+3.1	30	+5.8	31	+13.3	16	+ 1.5
Los Angeles	24	+3.1	8	−3.8	30	+11.6	23	+ 4.7
Jacksonville	25	+3.2	10	−2.5	29	+11.0	31	+17.0
Philadelphia	26	+4.0	21	+1.8	16	− 1.0	27	+ 9.3
Baltimore	27	+4.1	28	+5.3	22	+ 3.0	21	+ 4.1
Norfolk	28	+4.3	23	+2.0	26	+ 8.1	19	+ 1.8
New York	29	+4.9	25	+3.7	19	+ 1.7	32	+17.0
Cleveland	30	+5.2	22	+1.8	25	+ 8.0	18	+ 1.8
Buffalo	31	+5.9	27	+4.8	24	+ 5.3	26	+ 6.9
Detroit	32	+8.1	31	+5.8	32	+22.1	24	+ 4.8

* The deviations are percentages of secular trend. The base lines used were indexes for total cost of living and the indexes for food, rent, and clothing of the Bureau of Labor Statistics.

clothing of the cities. The base used in each case was the total index representing each of the three items of food, clothing, and rent. Food prices showed a range of 14.4 per cent, clothing, 29.4 per cent, and rent, 41.1 per cent. The table also indicates the existence of a definite tendency for the changes in food prices, rent, etc., to "compensate" each other, i. e., cities which showed low average deviations in the prices

the case of food prices 39 cities were reported in 1913, and this number was increased until, in 1920, 51 cities were included. The indexes of rent for 1914 and for 1917 were identical. With regard to the index of clothing we have to assume that the prices for the 13 cities in 1917 increased at the same rate as those for the 19 cities.

of one of the constituents of the family budget manifested larger deviations for one or both of the other items.

When the deviations of the 32 cities from 1917 to 1927 were grouped as is shown in Table II, considerable differences were apparent in the

TABLE II

RANKING WITHIN GEOGRAPHICAL DIVISIONS OF AVERAGE DEVIATIONS OF CHANGES IN TOTAL COST OF LIVING, FOOD, CLOTHING, AND RENT OF THIRTY-TWO CITIES, 1917–1927 *

City	Total cost	Food	Rent	Clothing	City	Total cost	Food	Rent	Clothing
North Atlantic					*North Central*				
Portland, Me.	− .6	+5.6	−19.0	+ .6	Kansas City	−3.1	−3.0	− 6.2	− 1.0
Boston	+ .5	+1.6	−11.8	+11.8	Minneapolis	−2.8	+1.4	−12.5	− 7.1
Pittsburgh	+ .9	+ .7	0.0	− 1.5	Cincinnati	−2.7	−1.0	−12.8	− 6.9
Scranton	+2.5	+3.4	− 4.0	+ 4.2	St. Louis	−1.4	−1.7	+ 4.3	− 5.4
Philadelphia	+4.0	+1.8	− 1.0	+ 9.3	Indianapolis	− .8	− .3	−12.1	− 4.1
New York	+4.9	+3.7	+ 1.7	+17.0	Chicago, Ill.	+3.1	+5.8	+13.3	+ 1.5
Buffalo	+5.9	+4.8	+ 5.3	+ 6.9	Cleveland	+5.2	+1.8	+ 8.0	+ 1.8
					Detroit	+8.1	+5.8	+22.1	+ 4.8
South Atlantic					*South Central*				
Washington, D. C.	−2.5	+6.2	−14.3	+ 2.7	Birmingham	−4.7	−2.0	+ 2.8	−12.4
Savannah	−2.7	−8.2	− 7.4	+ 5.2	Mobile	−1.8	+1.2	− 9.2	−11.1
Richmond	−4.2	−2.4	−15.7	− 3.1	New Orleans	−1.3	−3.8	− 5.8	+ .9
Atlanta, Ga.	−3.5	− .9	− .5	− 8.6	Memphis	− .9	−5.2	+ 2.2	− 6.8
Jacksonville	+3.2	−2.5	+11.0	+17.0	Houston	+2.3	+4.0	−15.1	+13.9
Baltimore	+4.1	+5.3	+ 3.0	+ 4.1					
Western									
Portland, Ore.	−6.4	−5.3	−10.9	− 7.5					
San Francisco and Oakland	−4.4	−2.9	−16.3	+ 9.9					
Denver	− .5	−3.8	+10.0	+ .9					
Seattle	+ .7	−4.8	+ 8.4	+ 1.7					
Los Angeles	+3.1	−3.8	+11.6	+ 4.6					

* The deviations are percentages of secular trend.

behavior of the changes in cost of living in each geographical division. In Table III are shown the ranges between the highest and lowest deviations for cities in the same geographical region.

TABLE III

	Total cost Per cent	Food Per cent	Rent Per cent	Clothing Per cent
North Atlantic	6.5	5.6	24.3	18.5
South Atlantic	8.3	14.4	26.7	25.6
North Central	11.2	8.8	34.9	11.7
South Central	7.0	9.2	17.9	26.3
Western	9.5	5.3	27.9	17.4

An examination of Table II reveals the fact that the cities of the North Atlantic division showed averages of deviations in total cost

that were with one exception above the base line as represented in the total index for 32 cities. This is largely explained by the fact that the changes in the prices of food and clothing were above the average of the country. The western division as well as the south central region were, with two exceptions, below the average of the total costs. The cities in the western group were consistently low in the average deviations of the prices of food and they were also, with one exception, consistently above the average in the price of clothing. Rents showed the least consistency in behavior in each of the geographical regions.

At this point caution in the use of these index numbers should be emphasized. When it is stated that the deviations from the total cost of living were greater for one city than for another, no distinction is made as to differences in cost between the two cities. This is because the data are index numbers expressed in terms of some earlier month or year as a base. It is not known how these cities differed as to absolute cost in the base year, and that is the crucial matter. All that the tables tell us is that when changes in the cost of living for 32 cities from December, 1917, to December, 1927, are compared with the changes in the cost of living for a given city for the same period, the given city shows on the average a greater or lesser change than the figure representing the total cost of living. Then, too, it is not known whether another group of cities within each geographical section, if figures were available, would show the same results.

One of the most conclusive tests demonstrating whether or not cities maintained a relatively constant difference between the changes in their cost of living was made when the post-war period was broken up into three "business cycles": (1) June, 1919, to December, 1921; (2) March, 1922, to December, 1924; and (3) June, 1925, to December, 1927. Averages of the deviations of the 32 cities from their secular trend were obtained for the first, second, and third post-war periods and were ranked. Table IV gives these averages for the total cost of living as well for the items of food, clothing, and rent.

The use of this ranking method would appear to show that there was no conspicuous constancy of change among the cities. Only eight cities, or 25 per cent of the total number, did not shift their positions more than two points during the three periods. Seven cities showed an upward trend, while five had a downward trend. Twelve cities manifested no evidence of any trend; seven of these cities had a higher rank in the second period than in either of the other two periods, and five had the lowest rank in 1922–24.

Of the specific items of food, clothing, and rent, clothing prices maintained the greatest degree of constancy, since 21 of the 32 cities did not

TABLE IV

RANKING OF THREE-YEAR AVERAGES OF COST OF LIVING FOR THIRTY-TWO CITIES, 1919–1927

City	Rank	Total cost, 1919–21	Rank	Total cost, 1922–24	Rank	Total cost, 1925–27	Rank	Food, 1919–21	Rank	Food, 1922–24	Rank	Food, 1925–27	Rank	Rent, 1919–21	Rank	Rent, 1922–24	Rank	Rent, 1925–27	Rank	Clothing, 1919–21	Rank	Clothing, 1922–24	Rank	Clothing, 1925–27
Portland, Ore.	1	−5.6	1	−6.2	1	−7.3	2	−4.9	3	− 4.9	2	− 7.6	15	− 4.9	9	−12.7	5	−17.7	3	− 9.5	5	− 7.8	7	− 6.3
Birmingham	2	−4.7	2	−4.8	6	−4.2	11	− 1.1	10	− 2.4	12	− 2.0	25	+ 7.4	22	+ 1.6	20	+ 1.1	1	−14.8	1	−11.4	2	−11.8
Richmond	3	−4.6	6	−3.8	8	−3.5	18	+ .5	17	+ .4	9	− 2.7	4	−15.4	6	−15.7	7	−16.6	10	− 2.0	10	− 3.6	10	− 4.1
San Francisco and Oakland	4	−4.4	4	−4.0	5	−4.5	5	−4.5	13	− 1.2	10	− 2.5	3	−15.7	2	−18.7	3	−17.8	26	+ 7.9	28	+11.1	29	+13.1
Los Angeles	5	−4.3	31	+6.1	21	+1.9	4	−4.7	14	− 1.1	5	− 5.7	27	+ 9.5	31	+20.1	21	+ 1.9	22	+ 3.3	24	+ 5.4	25	+ 6.2
Cincinnati	6	−4.2	9	−3.2	16	0	13	− .8	12	− 1.3	16	+ .5	2	−16.1	7	−14.0	17	− 5.6	16	+ .4	4	− 8.4	1	−12.0
Minneapolis	7	−3.7	11	−1.7	7	−3.8	23	+2.6	19	+ .8	19	+ 1.5	9	−10.9	11	−11.4	6	−17.2	6	− 6.4	6	− 7.2	3	− 8.4
St. Louis	8	−3.4	13	− .9	19	+ .5	10	− 1.5	9	− 2.8	14	− .1	17	− 3.8	27	+ 6.3	30	+11.3	8	− 3.2	7	− 6.8	8	− 5.3
Washington, D. C.	9	−3.3	10	−3.0	9	−3.1	30	+5.2	32	+ 6.8	30	+ 6.2	6	−14.5	3	−18.6	8	−16.4	12	− .3	21	+ 3.5	19	+ 3.7
New Orleans	10	−2.7	14	− .2	13	−1.5	7	−3.8	7	− 3.5	6	− 4.9	12	− 8.9	15	− 4.3	16	− 5.8	13	+ .3	15	+ .7	15	+ 2.5
Atlanta	11	−2.1	5	−3.9	4	−5.0	12	− .9	11	− 1.7	13	− .2	26	+ 8.1	20	− 2.0	12	−11.3	4	− 8.3	3	−10.1	4	− 8.0
Indianapolis	12	−2.1	16	− .1	15	− .5	16	+ .4	15	− .9	15	+ .3	8	−11.4	10	−12.0	9	−15.8	7	− 3.4	9	− 4.4	9	− 4.7
Mobile	13	−1.6	7	−3.6	12	−1.6	20	+2.1	18	+ .5	18	+ 1.3	18	− 2.0	12	−11.2	11	−15.5	2	−13.2	2	−11.4	5	− 8.0
Memphis	14	−1.3	17	+ .1	10	−2.4	9	−2.4	2	− 6.4	3	− 7.1	24	+ 5.4	25	+ 5.0	18	− 5.3	5	− 7.1	8	− 6.5	6	− 7.2
Denver	15	−1.3	18	+ .3	11	−2.4	6	−4.1	4	− 4.5	7	− 4.5	28	+10.9	29	+13.1	24	+ 3.8	19	+ 2.1	14	+ .2	14	− 1.0
Pittsburgh	16	−1.1	19	+1.2	23	+2.9	14	− .5	21	+ 1.4	20	+ 1.5	16	− 3.7	21	− 1.4	27	+ 6.4	14	+ .3	12	− 1.4	12	− 4.0
Kansas City	17	− .8	8	−3.3	3	−5.9	15	− .4	5	− 3.9	8	− 3.4	20	+ 1.5	14	− 5.0	4	−17.8	20	+ 2.4	11	− 1.7	11	− 4.1
Portland, Me.	18	0	12	−1.0	14	−1.0	31	+5.3	31	+ 6.6	28	+ 5.6	6	−14.3	1	−21.8	1	−24.3	9	− 2.2	17	+ 2.4	18	+ 3.4
Boston	19	+ .3	15	− .4	18	+ .5	22	+2.4	23	+ 2.6	17	+ .9	1	−16.2	8	−13.2	13	− 8.7	30	+12.5	29	+11.8	28	+11.9
Savannah	20	+1.2	3	−4.4	2	−6.6	3	−4.8	1	−11.2	1	− 9.3	19	+ .1	13	− 8.4	10	−15.7	25	+ 7.8	20	+ 3.4	20	+ 4.2
Seattle	21	+1.6	21	+1.3	17	0	1	−6.1	6	− 3.5	4	− 5.9	30	+19.9	16	− 4.0	19	− 1.6	15	+ .3	18	+ 2.4	23	+ 4.9
Scranton	22	+1.8	23	+2.8	27	+5.3	26	+3.6	24	+ 3.3	25	+ 3.7	7	−13.0	17	− 3.2	23	+ 3.6	21	+ 2.7	23	+ 5.3	24	+ 5.6
Chicago	23	+1.9	24	+3.1	26	+4.8	24	+2.9	30	+ 6.6	32	+ 9.5	22	+ 3.3	30	+17.8	32	+20.8	17	+ 1.1	13	− 1.0	13	− 2.3
Philadelphia	24	+2.3	27	+4.0	29	+6.2	17	+ .4	22	+ 1.8	21	+ 1.6	24	− 5.4	18	− 2.3	28	+ 7.0	28	+11.2	27	+ 9.0	26	+ 9.7
Baltimore	25	+2.6	26	+3.9	25	+4.7	28	+4.2	28	+ 5.2	29	+ 5.6	21	+ 2.2	23	+ 2.9	25	+ 3.9	23	+ 3.8	22	+ 4.4	21	+ 4.5
Houston	26	+3.0	22	+2.5	20	+ .7	29	+4.9	25	+ 3.7	24	+ 3.2	10	−10.9	5	−16.6	2	−19.0	29	+11.2	30	+15.8	30	+15.0
Jacksonville	27	+4.2	20	+2.1	24	+4.6	8	−3.0	8	− 2.9	11	− 2.1	11	− 9.0	4	−18.2	15	− 6.7	31	+18.1	32	+17.3	31	+15.3
New York	28	+4.5	28	+4.9	28	+5.7	21	+2.3	26	+ 4.5	26	+ 4.0	14	− 5.4	19	− 2.3	22	+ 3.1	32	+19.4	31	+16.7	32	+17.6
Buffalo	29	+4.5	29	+5.6	31	+6.9	27	+3.8	27	+ 4.8	27	+ 5.0	23	+ 3.6	24	+ 3.1	29	+ 9.9	27	+ 8.1	26	+ 5.9	27	+ 9.9
Cleveland	30	+5.0	30	+5.9	30	+6.7	19	+1.6	20	+ 1.1	23	+ 3.5	29	+13.1	28	+ 6.5	26	+ 4.6	18	+ 1.7	16	+ 2.0	16	+ 2.7
Norfolk	31	+6.9	25	+3.3	22	+2.6	25	+3.4	16	− .8	22	+ 2.6	31	+25.2	26	+ 5.5	14	− 8.4	11	− .4	19	+ 3.3	22	+ 4.5
Detroit	32	+9.5	32	+7.5	32	+8.5	32	+5.8	29	+ 5.4	31	+ 7.1	32	+26.5	32	+20.2	31	+18.0	24	+ 5.9	2	+ 5.4	17	+ 3.4

change their relative positions more than three points in either direction throughout the three periods. In the case of food, 15 cities were "constant"; in the case of rents, 9 cities did not shift their position more than three points in either direction. Rent showed a more definite trend than either food or clothing, 6 cities showing an upward trend, and 8 a downward trend.

Of much greater significance are the comparisons of the averages of the deviations during the three periods. When the number of cities showing a range of variation less than 3 per cent in total cost during the whole nine-year period were counted, 22, or almost 70 per cent of the total were found within this range. When the same procedure was adopted for the specific items, 26 cities showed a variation of less than 3 per cent in food prices, 6 cities fell within these limits in the case of rent, and 23 cities, in the case of clothing prices.

The following conclusions may be drawn from this survey:

1. The cost of living in the South seems to be lower than in the North or the West. This does not mean, however, that a given state or city in the South has a lower average expenditure for a working-class family than a state or city located in another geographical division. All that is meant is that when we compute a single value which is an average of the figures of family expenditures for a number of states in the South and compare it with an average figure for a few western states and a larger number of northern states, the amount expended per family is somewhat lower in the first region than in the other two.

2. There was as much variation *within* a geographical area as *among* these divisions.

3. Assuming that the budget studies of the Bureau of Labor Statistics were comparable, it was found that it was a matter of "accident" for a state to remain in approximately the same position in 1918, 1901, and 1890.

4. The *indexes* of cost of living appear to indicate that there was as much variation in the *changes* in costs among cities in the same geographical division as among the geographical divisions.

5. Most of the cities maintained a range of variation of less than 3 per cent in their average deviations during the three post-war business cycles.

What bearing have these conclusions upon the problem of the differential wage? To achieve equality of pay by adopting the principle of the differential, the government, for example, could not use budget figures which represented individual cities if only because the proportion of the different income groups selected varies with the judgment of the agents. At best, it would be able to set up two or more wage

standards, depending upon the number of geographical regions into which the country was divided. This would mean that the administrative agency would be confronted with the task of enforcing two or more norms which were highly fictitious in character precisely because of the degree of variation in costs within the boundaries of each territory. Nor could the *indexes* of cost of living for cities be of any assistance—despite the fact that they maintained a fair degree of constancy during the whole of the post-war period—because of the difficulty of interpreting the original budgets which are the bases for these indexes and also because it is rather doubtful whether the prices of the items which comprise these local indexes are comparable.

One other aspect of budget studies should be mentioned—a point of view which is stressed by many business firms: Employers of labor have been accustomed to recognize differences in standards of living, and the policy of a uniform rate of pay, especially if the scale were liberal, would place a heavier burden upon those employers whose enterprises were situated in localities where these standards were relatively low. This position raises the issue whether, for example, wages in the South are relatively lower than in other sections because the standards of living are lower, or whether standards of living are lower because wages are lower. In other words, do wages and standards of living operate reciprocally, or has one factor a much more decisive influence than the other?

For all practical purposes of wage policy, we cannot hesitate to state that the change in income is the conditioning factor in the changes in standard of living. Change the income, and the amount of money spent per family varies accordingly. The expenditures of 32 cities in 1918–19 were correlated with the incomes received per family; and an almost one-to-one correspondence was found. Cities that showed high family expenditures revealed high incomes, and vice versa. Furthermore, when the amounts of expenditure per family at different economic levels in these cities were compared, the same thing was true, namely, the families that received a greater income spent more. This clearly points to the conclusion that wages paid are the determining factors in this problem. If the government were to choose a differential wage policy largely because employers customarily pay lower wages in some localities than in others on the ground of differences in living standards, it would be adopting a course of action that would be a good illustration of placing the cart before the horse. For practical purposes, changes in wages make for changes in standards of living, not the reverse.

Finally, it should be stated that the conclusions set forthin this paper not only hold true with respect to the budget studies of the past but,

it is believed, would be confirmed by subsequent investigations similar to the one conducted by the Bureau of Labor Statistics almost a decade ago. Perhaps the differences in family expenditures between broad geographical areas would not be so large, but a considerable range of variation would be shown within each division, nevertheless. The uncertainties of interpretation as well as the doubts with respect to the sampling process would still remain. The root of the difficulties connected with budget and cost-of-living studies lies in the fact that fundamentally they are based upon *subjective judgments*. The margin of error in selection of samples of budgets and prices in different localities largely accounts for the variations shown by the figures that have been and are now being published.

THE PHYSICAL MEASUREMENTS OF HOLLINS FRESHMEN, 1920–1927 [1]

By Gladys L. Palmer, *Hollins College*

This study was undertaken with two major purposes in mind. The first was to see how the physique of girls entering college from the Southern States compared with that of students from other parts of the country. The second aim was to find out whether statistical analysis of the physical measurements of college freshmen would shed any light upon the problem of measuring physical fitness among college students. The whole discussion of "physical fitness" has been subject to a large amount of unsupported generalization in medical journals and elsewhere. Both fields of inquiry have been characterized by inadequate data or by insufficient statistical analysis and conflicting conclusions. Although departments of physical education have been taking measurements of college students for years, relatively little use has been made of these measurements for purposes of research. There is an especial dearth of knowledge with respect to the physique of college women. It seems probable, therefore, that a statistical study of the body measurements of an unusually homogeneous group drawn largely from a particular section of the country, over a period of eight years, may make some contribution to these important questions, even if the conclusions are largely negative.

The physical measurements on which this study is based were made by six different members of the Physical Education Department of Hollins College from the fall of 1920 through the fall of 1927. The same apparatus was used during this period—a standard Fairbanks scale and a Narragansset Machine Company stadiometer and wet spirometer. Although instructions for taking the measurements remained the same, it is probable that a measure made with a tape line, such as that of chest girth, may be less reliable than the others. Standing height was measured with the center of the heels back against the rod; sitting height was measured with hips back, knees flexed and feet on floor. Chest girth was measured at rest, with the tape line at the arm pits, above the breasts. In measuring vital capacity, students were instructed to breathe deeply and blow as hard as possible; the

[1] I am indebted to my students in statistics in the years 1926 and 1927 for assistance in copying the records and in computations. All computations were checked by me. I am also indebted to Dr. Dorothy Seago, of Hollins College, for helpful criticism; and to Miss Mary Ann Hooper, Hollins '27, for the preparation of the accompanying bar diagram.

highest of three trials was then recorded. Something less than 100 cases were omitted from the study because the original gymnasium records had been lost or were incomplete, or because the recorded students had entered as "transfers" with higher academic standing than that of the freshman class. A total of 1,017 cases was available for analysis. These cases have been studied chronologically, by class, in order to show trends in the measurements.

The student body of Hollins College is composed of young women coming primarily from the Southern States. Between 1920 and 1927 a proportion ranging from 60 to 83 per cent of all students came from the South Atlantic and East South Central states, with a scattering from other states. Virginia has always been the state which contributed the largest single group. Records of the ancestry of the freshmen classes entering in 1926 and 1927 reveal a high percentage of students who are native-born of native parentage, many of whom had parents and grandparents born in the same state. There were but six students in the two classes who had either or both parents born abroad, and they had come from the countries of northern Europe or Canada. There is no reason to believe that this record of ancestry is not typical of previous classes and that the college has not always been made up of a strikingly homogeneous racial group. The average age of freshmen entering between 1920 and 1928 was seventeen and a fraction years for each class. Hollins freshmen are on the average almost a year younger than freshmen entering many northern women's colleges.

Measurements of height, weight, chest girth (at rest), and vital capacity were used as the basis of the study.[1] The arithmetic means, standard deviations and coefficients of variability of these measures are presented by class and for the whole series of 1,017 cases, in Tables I, II, and III. The mean heights (Table I) of the eight freshman classes ranged from 63.24 to 64.36 inches, about a mean of the series of 63.86 inches, with standard deviations from 1.77 to 2.35 inches. The percentage variability of the items about the means was slight. Hollins students are on the average not so tall as students in other women's colleges for whom recent norms are available. Vassar students measured between 1884 and 1927, when grouped by five-year intervals, ranged from 63.24 to 65.0 inches in average height.[2] The average height of 160 Stanford women from 16 to 19 years of age (data pub-

[1] The measurement of vital capacity was omitted from the Physical Education Department examination between 1924 and 1927.

[2] Mabel Newcomer, "The Physical Development of Vassar College Students, 1880–1921," this JOURNAL, December, 1921, Vol. 17, pp. 976–983.

Statistics Class, "Physical Development of Vassar Students, 1921–1927." *Vassar Journal of Undergraduate Studies*, May, 1928, pp. 2–11.

TABLE I

STANDING AND SITTING HEIGHTS OF HOLLINS FRESHMEN

Class entering	Number of cases	Standing heights (inches)			Sitting heights (inches)		
		Mean	Standard deviation	Coefficient of variation (per cent)	Mean	Standard deviation	Coefficient of variation (per cent)
1920.....	85	63.24	2.35	3.72	33.40	1.06	3.18
1921.....	125	63.74	1.77	2.78	33.77	.87	2.58
1922.....	127	63.95	1.93	3.02	34.23	1.00	2.93
1923.....	128	64.04	2.12	3.36	33.98	1.04	3.06
1924.....	143	64.36	2.22	3.42	34.17	1.08	3.16
1925.....	128	63.81	2.05	3.21	33.01	1.27	3.85
1926.....	140	63.88	2.17	3.39	33.71	1.04	3.09
1927.....	141	63.83	1.94	3.04	33.38	1.19	3.62
Total.....	1017	63.86	2.09	3.27	33.81	1.03	2.97

lished in 1924) was 63.63 inches, with a standard deviation of 2.15 inches.[1] A study of 75 freshmen women entering the University of Arizona in 1923 showed an average height of 62 inches, which is smaller than that of any other college group reported.[2] A group of 100 selected Smith students averaged 64.53 inches in height (1638 mm.), with a coefficient of variation of 3.3 per cent.[3] A large group of 1,150 Wellesley freshmen (data published in 1927) had a mean height of 64.13 inches (162.9 cm.) with a standard deviation of 2.24 inches (5.69 cm.).[4] Smith students and recent Vassar and Wellesley freshmen are taller than the Hollins freshmen average for the eight-year period. The arithmetic mean of the sitting heights of Hollins freshmen (Table I) ranged from 33.01 to 34.23 inches, with most means falling above 33.5. Standard deviations ranged from .87 to 1.27 inches, with a low percentage of variability. Norms for sitting height measurements from other colleges are not available except in the cases of Smith and Stanford. Smith students averaged 34.06 inches in sitting height (864.49 mm.), with an average variation of 3 per cent.[5] Stanford students from 16 to 19 years old averaged 33.46 inches in sitting height, with a standard deviation of 1.08 inches.[6] The selected group of Smith students and Hollins freshmen had a slightly longer sitting height than that found for Stanford women in 1924.

[1] Edith E. Pasmore and Frank W. Weymouth, "The Relation of Vital Capacity to Other Physical Measurements in Women," *American Physical Education Review*, April, 1924, pp. 166–175.

[2] I. E. Gittings, "Correlation of Mental and Physical Traits in University of Arizona Freshmen Women," *American Physical Education Review*, October, 1927, Vol. 32, pp. 569.

[3] H. H. Wilder and M. W. Pfeiffer, "Bodily Proportions in Women in the United States; based upon measurements taken from one hundred Smith College students," *Smith College Contributions from the Department of Zoölogy*, No. 127, 1924.

[4] Abby Turner, "Vital Capacity of College Women," *American Physical Education Review*, October, 1927, Vol. 32, pp. 593–603. [5] Wilder and Pfeiffer, *loc. cit.* [6] Pasmore and Weymouth, *loc. cit.*

The measures of chest girth and vital capacity were found to have a higher variability than the other measures discussed so far. In the case of chest girth two factors may account for this difference. In the first place, weight shows considerable variability for the students studied at Hollins, and it is logical to assume because of the functional relationship between chest girth and weight that this condition would be reflected in changes in chest girth. There seem to be other sources of variability, however, which probably reflect changes in the method of taking the measure. Hollins freshmen were found to have mean chest girths ranging from 27.85 to 31.74 inches, about a mean for the entire series of 29.35 (Table II), while the standard deviations ranged

TABLE II

CHEST GIRTH AND VITAL CAPACITY OF HOLLINS FRESHMEN

Class entering	Number of cases	Chest girth (inches)			Vital capacity (cubic inches)		
		Mean	Standard deviation	Coefficient of variation (per cent)	Mean	Standard deviation	Coefficient of variation (per cent)
1920.....	85	31.13	1.87	6.01	173.17	23.90	13.80
1921.....	125	28.39	1.83	6.45	170.30	21.68	12.73
1922.....	127	28.08	1.74	6.20	167.37	21.35	12.76
1923.....	128	27.98	1.65	5.90	176.49	23.32	13.22
1924.....	143	28.58	1.85	6.47	Data not available		
1925.....	128	27.85	1.57	5.64	" " "		
1926.....	140	31.25	1.76	5.63	" " "		
1927.....	141	31.74	1.92	6.05	172.45	27.78	16.11
Total...	1017	29.35	2.37	8.08	171.87	24.00	14.00

from 1.57 to 1.92 inches. The coefficients of variability were higher than for the height and sitting height measurements, and the variability of the entire series is greater than that for any single class. Stanford is the only college for which norms are available. Here the students 16 to 19 years old were found to have an average chest girth of 32.38 inches, with a standard deviation of 1.82 inches, and a percentage variability of 5.6 per cent.[1] It will be seen that Stanford women of age comparable to that of Hollins freshmen have on the average a larger chest girth than Hollins freshmen, although this difference may be the result of a difference in taking the measurement rather than of actual physical conditions. The Stanford figure also shows less percentage variability than the Hollins norms.

The measurement of vital capacity is generally admitted to be subject to greater variation than the other measures discussed up to this point.

[1] Pasmore and Weymouth, *loc. cit.*

Vital capacity is known to vary with occupation, physical training, posture and obesity, as well as with race, nationality, sex and age.[1] In this study of a particularly homogeneous group with respect to race, age, occupation and sex, the matter of development with physical exercise would be of greatest importance as a factor in the variability of the measures. One might mention the special case of a student who plays the cornet and because of the resulting development of her lung capacity attained the highest vital capacity record of her class. Past history of disease may have affected lung capacity in some instances also, but information on this point is not available. The average vital capacity of Hollins freshmen ranges from 167 to 176 cubic inches, about a general mean of 171 cubic inches with coefficients of variation from 12 to 16 per cent (Table II). Vassar students grouped in five-year intervals from 1901 to 1927 averaged between 166 and 191 cubic inches in vital capacity.[2] Stanford women of ages 16 to 19 had a mean vital capacity of 170.27 cubic inches, with a coefficient of variation of 17 per cent.[3] Freshmen women at the University of Arizona had an average vital capacity of 172 cubic inches (standard deviation—24 cubic inches).[4] All of these norms, except the ones for Vassar, are lower than the average vital capacity of Wellesley freshmen, which was 182.53 cubic inches (2.99 litres), with a standard deviation of 29.31 cubic inches (0.48 litres).[5] In the Wellesley study it is claimed that students of high vital capacity are definitely more "physically fit," as measured primarily by participation in athletics, than students of low vital capacity.[6]

Interest centers in the weights of Hollins freshmen because this was found to be a measure of high variability, and because this study was undertaken for a period when style changes were reflected in body build, or more specifically, in students' weights. The average weights of the eight freshmen classes studied (Table III) varied from 112 to 120 pounds, about a mean for the whole series of 115 pounds, with standard deviations ranging from 13 to 17 pounds, and coefficients of variability from 12 to 14 per cent. The medians have also been computed for the weights, because one or two extreme cases in several classes distorted the value of the arithmetic means. There is found a close correspondence between the mean and the median for only one of the eight classes. In the other classes the median is from 1 to 4 pounds less than the mean and should be taken as the more typical average. The median weight declined from 116 pounds for the class entering in 1920 to 110 pounds for the class entering in 1925, but shows an increase for the classes en-

[1] J. A. Myers, *Vital Capacity of the Lungs*, Baltimore, 1925. Ch. 2. [2] Newcomer, *loc. cit.*
[3] Pasmore and Weymouth, *loc. cit.* [4] Gittings, *loc. cit.* [5] Turner, *loc. cit.* [6] *Ibid.*

TABLE III

WEIGHTS OF HOLLINS FRESHMEN (POUNDS)

Class entering	Number of cases	Mean	Standard deviation	Coefficient of variation (per cent)	Median
1920	85	120.18	15.39	12.81	116.79
1921	125	114.74	14.87	12.96	114.86
1922	127	115.87	14.97	12.92	114.41
1923	128	117.66	17.00	14.45	115.86
1924	143	115.41	15.87	13.75	113.78
1925	128	112.34	13.96	12.54	110.96
1926	140	112.85	15.56	13.79	113.74
1927	141	116.77	16.76	14.35	115.21
Total	1017	115.65	15.78	13.64	114.04

tering in 1926 and 1927. The lowest point for both median and mean weights was reached by the class entering in 1925, when the mean weight was 112 pounds, and 110 pounds was the figure below and above which one half of the members of the class fell. The decline in weights is illustrated in another way in Table IV and in the accompanying bar diagram. This shows the percentage of each freshman class in a "normal" weight zone, extending from 7 per cent below to 20 per cent above the average weight for height and age, according to the medico-

TABLE IV

WEIGHT CLASSIFICATION OF HOLLINS FRESHMAN, 1920–1927

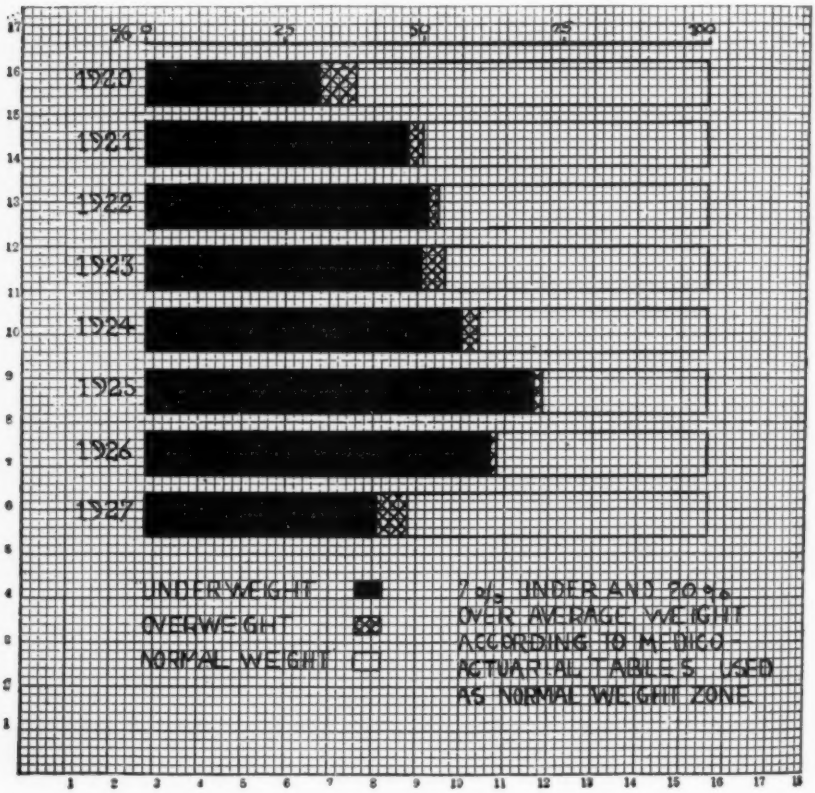
Class entering	More than 7% under average weight *	More than 20% above average weight *	"Normal" weight—between 7—20% below and above average weight *
	(Per cent)	(Per cent)	(Per cent)
1920	31.7	6.0	62.3
1921	47.0	2.3	50.7
1922	50.0	2.0	48.0
1923	49.3	3.7	47.0
1924	56.0	3.0	41.0
1925	69.6	.7	29.7
1926	62.0	1.0	37.0
1927	41.2	5.6	53.2

* Average weight for height and age according to medico-actuarial tables. (1½ inches allowed for shoes, and 4 pounds for clothes).

actuarial weight tables for women. Without discussing at this point the merits of this commonly used standard as an index of physical fitness, one may point out the noticeable increase in the number of freshmen who are more than 7 per cent "underweight" for height and age—an increase of from 32 to 70 per cent between 1920 and 1925. This decline in weights is followed by an increase in 1926 and 1927. The only other college for which comparable figures are available is Vassar, where

there has been a steady increase in average weights from 1891 to 1927, although the rate of increase has been lower in recent years.[1] Until more data are available on the trend of weights of women students in other colleges, we shall be unable to draw conclusions concerning the influence of style changes in college women's weights in recent years.

WEIGHT CLASSIFICATION OF HOLLINS FRESHMEN ENTERING 1920–1927



The impression of the public appears to be that this influence has been considerable.

It may give one pause that about one half of each freshman class at Hollins since 1921 has been more than 7 per cent under the average weight for corresponding age and height in the general population. Nutrition experts have become alarmed at the "serious condition of physical fitness" in the colleges.[2] But physical fitness is too complex a

[1] Newcomer, *loc. cit.*

[2] W. R. P. Emerson, "Physical Fitness in the Colleges," *Journal American Medical Association*, Vol. 85, pp. 1511–1513, May 15, 1926, and "Health Diagnosis in College," *Survey*, January 15, 1926, p. 478.

situation to be summed up in a simple formula, or in a single physical measurement such as weight. In the absence of external criteria of physical fitness with which weight standards may be statistically compared, one is unable to generalize as to what constitutes "normal" weight, or whether people in certain weight zones are physically fit or not. Such criteria should measure physical efficiency or capacity, motor coördination and posture, as well as "good" and "bad" nutrition, if the quantitative analysis of physical fitness is to be facilitated.[1] We have found that organic fitness, as measured by vital capacity, for example, bears no definite relationship to anthropometric measurements,[2] and we may find that other aspects of physical fitness are not so related. Weight zones are set up on the basis of clinical judgment only, and there is considerable discrepancy between the results obtained when a group is classified according to several standards.[3] One may question, too, the validity of setting up standards of weight based upon unrefined averages of the weights of insurance policy-holders, most of whom were measured before 1900, as in the medico-actuarial tables. Although this criticism is widely admitted and the tables have been modified for special work, they still constitute the major source of information concerning women's physique and are extensively used as criteria of nutrition and physical fitness. A pooling of the mass of data available in the physical education and medical departments of the women's colleges would be most useful in this connection because of the relative homogeneity of the groups measured, the increasing precision which has been developed by the colleges in the taking of physical measurements, and the possibility of testing physical efficiency and good health over several years of college life by different methods.

On the whole, the average weight of Hollins Freshmen during the period 1920–1927 is lower than that of other college students for whom norms are available. Vassar students ranged from 118 to 125.2 pounds in average weight between the years 1884 and 1927. The Hollins mean

[1] An attempt was made to secure a statistical approach to this problem with one class of Hollins freshmen. Weight-height indexes (grouped in zones which roughly corresponded with the common standards of "normal," "under" and "over" weight) were correlated with posture grades, gymnasium grades and points awarded in athletics, to see whether "normal" weight indicated physical fitness as measured by activity in athletics and good posture. The correlation coefficients were either negative or insignificant.

[2] The coefficients of correlation computed for the relationship of vital capacity to other physical measures of Hollins freshmen in all classes were of no statistical significance. See also C. M. Jackson, "The Relationship between Body Build and Physiological Characters in University Students," *Minnesota Medicine*, August, 1927, pp. 465–467, and "The Physique of Male Students at the University of Minnesota," *American Journal of Anatomy*, Vol. 40, No. 1, September 15, 1927.

[3] Four classes of Hollins freshmen (523 cases) were classified according to three widely used standards for determining "under," "over" and "normal" weight groups, proposed respectively by Emerson, Wood and Dreyer. In only 29 per cent of the cases was the classification the same, according to the three standards. How great the discrepancies may be is shown by the fact that 6 per cent of the cases were found to be "underweight" according to two standards and "overweight" according to the third.

weights approach the norms for Vassar students in the years from 1884 to 1895, that is to say, in a period before physical exercise, participation in sports and new styles of dress led to increasing measurements for college women over the whole country.[1] Stanford women (data published in 1924) had a mean weight of 120 pounds, with a coefficient of variability of 13 per cent. Women entering the University of Arizona in 1923 averaged 118 pounds in weight.[2] The more recent study of Wellesley freshmen showed an average weight of 121 pounds, with a standard deviation of 18 pounds.[3] Obviously Hollins freshmen are of more slender build than Vassar and Wellesley freshmen, and they were of lighter build than Stanford and Arizona freshmen when their measurements were taken. Is this difference of geographical significance? Data on this point are difficult to secure and sufficient information is not available for proving a difference in body build for southern college girls. Hrdlicka, in his study of the "Old Americans," after examining the earlier statistics for college women, stated that there were no significant sectional differences.[4] In another connection, however, he cites the pertinent fact that army men from certain southern states during the Civil and World Wars showed an unusually slender type of build.[5] Further study of this problem may bring to light other evidence of sectional differences of body build.

No study has been made of the effect of college life upon the physical measurements of Hollins students, although four examinations are recorded for all students. It is the impression of the members of the physical education department that the measure which shows the greatest increase is vital capacity. Slight changes occur in the height measurements, and many students appear to gain in weight during the college year but lose again during the summer, so that few students change their weight classification during the freshman and sophomore years. This too would appear to be an interesting field for further investigation.

SUMMARY

1. A statistical analysis was made of the physical measurements of 1,017 freshmen entering Hollins College between 1920 and 1928. The students studied form a highly homogeneous racial group, and they come primarily from the Southern States.

2. The only significant chronological change in the measurements is found in the decline of mean and median weights and in the increase of

[1] Newcomer, *loc. cit.* [2] Gittings, *loc. cit.* [3] Turner, *loc. cit.*

[4] Ales Hrdlicka, "The Anthropology of the Old Americans," *American Journal of Physical Anthropology*, July–September, 1922, Vol. 5, p. 216.

[5] *Idem., The Old Americans.* Baltimore, 1925, pp. 100–101.

the percentage of students in "underweight" classifications between 1920 and 1925. Although Vassar students increased in average weight during this period, sufficient data are not available for determining what has been the experience in other women's colleges.

3. Hollins freshmen are not so tall as college students at Wellesley, Vassar and Smith. They average less vital capacity than Wellesley and Vassar freshmen, and have lower average weights than all other college students for whom recent information is recorded. Sufficient data are not available for determining whether these are sectional differences.

4. The problem of measuring physical fitness is too complex for solution by reference to physical measurements alone. The suggestion is made that external criteria of good health and physical efficiency be further elaborated in order that the relationship of physiological and anthropometric measurements to them may be statistically demonstrated.

FACTS ABOUT MEXICAN IMMIGRATION BEFORE AND SINCE THE QUOTA RESTRICTION LAWS

By Louis Bloch, *California Department of Industrial Relations*

In this article are presented the results of a study of available statistics of Mexican immigration as published by the Commissioner General of Immigration and of related United States census data. These statistics have been analyzed with a view to crystallizing the changes which have taken place in the volume and character of our immigration since the enactments of the 1921 and 1924 per centum limitation laws, known as the quota laws.

The first per centum limitation law went into effect on June 3, 1921. This law restricted the admission of aliens in any one year to 3 per cent of the number of foreign-born persons of each nationality residing in the United States in 1910, as determined by the federal census of that year. The new immigration law, which went into effect on May 26, 1924, reduced the quota of admissible aliens from 3 to 2 per cent. Section 11 (a) of the immigration act of 1924 provides that the annual quota of any nationality shall be 2 per cent of the number of foreign-born individuals of such nationality resident in continental United States as shown by the federal census of 1890, but that the minimum quota for any nationality shall be 100 per year. This change in the basis for computing the quotas was especially significant because it was aimed at reducing the number of admissible immigrants from countries of southern and eastern Europe in preference to immigrants from countries of northern and western Europe.

Under the 1924 immigration law the total immigration of aliens from quota countries was restricted to 164,667 annually. Of this total, the annual quota for northwestern Europe was 140,909, or 85.6 per cent; for southern and eastern Europe and Asia, 21,847, or 13.3 per cent; for Africa, Australia, New Zealand, and other Pacific islands, 1,821, or 1.1 per cent of the total.

But although the 1924 immigration act effectively restricts the number of admissible aliens from European countries, it exempts from its quota provision immigrants born in the Dominion of Canada, Newfoundland, the Republic of Mexico, the Republic of Cuba, the Republic of Haiti, the Dominican Republic, the Canal Zone, or in an independent country of Central or South America. Aliens from these countries are defined by the law as "non-quota" immigrants.

In considering statistics of Mexican immigration, it is especially important to recognize the distinction between *actual* and *reported* immigration. The data published in the reports of the Commissioner General of Immigration show the legally admitted aliens. But in the case of the Mexicans the number of illegal entrants is in all probabilities very considerable. The actual immigration would include the legal and the illegal entrants.

The extent of illegal entries of Mexicans into the United States is revealed by a comparison of the United States census data on the number of Mexicans in this country at decennial census periods with available data on total and net Mexican immigration. Thus, in 1900 the census reported the total number of Mexicans residing in the United States as 103,393. The total number of alien Mexican immigrants who came into this country legally between 1901 and 1910 was 41,490. The highest possible number of Mexicans in the United States at the time of the 1910 census should not have been in excess of 103,393 plus 41,490, or 144,883.[1] But, instead, the 1910 census enumerated 221,915 Mexicans in the United States. This number is 77,032 more than could be expected in view of the legal number of Mexican entrants into this country between 1901 and 1910. Assuming that the enumeration in the census years considered was equally accurate, it may be roughly estimated that approximately 100,000 Mexicans entered this country illegally between 1901 and 1910.

Similarly, for the next decade, in 1910 the census showed 221,915 Mexicans in the United States. The net increase in the foreign-born Mexican population through excess of immigration over emigration between 1911 and 1920 was 152,541. The total number of Mexicans that could be expected at the 1920 census should be 221,915 plus 152,541, or 374,456. But, instead, the 1920 census reported 486,418 Mexicans in the United States, or 111,962 more than could be expected if only the legal entrants were considered. On the basis of these figures, it appears fair and conservative to estimate that during the twenty years, 1901–1920, about 200,000 Mexicans entered this country illegally.

The difficulties of enforcing our immigration laws along the Mexican border are recurrently described in the annual reports of the Commissioner General of Immigration.

In the absence of reliable information as to the volume of smuggling of Mexican immigrants before and since the per centum limitation

[1] The total number of Mexicans in the United States enumerated in 1900 was added to the total number of immigrants into the United States during 1901–1910. This does not take into consideration the emigrant alien Mexicans, or the number of persons born in Mexico who died between 1901–1910. Statistics of emigration are not available until 1908. If these factors could be taken into account, the number of Mexicans at the 1910 census should be considerably lower than 144,883.

laws of 1921 and 1924, only the reported legal entries of Mexicans are analyzed in this article.

Since the 3 per cent quota law did not go into effect until June 3, 1921, and the 2 per cent quota law did not go into effect until May 26, 1924, the effect of these laws upon immigration from Mexico may be measured by a comparison of statistics of Mexican immigration before July 1, 1921, from July 1, 1921, to July 1, 1924, and since July 1, 1924. In the following table are presented data showing the number and proportion of Mexican immigrants to the total immigration prior to July 1, 1921.

TABLE I

NUMBER AND PER CENT OF MEXICAN IMMIGRATION OF TOTAL IMMIGRATION INTO THE UNITED STATES FROM 1881 TO 1921, BY DECADES *

Decades	Total number of immigrants	Number from Mexico	Per cent from Mexico
1881–1890	5,246,613	1,913	‡
1891–1900	3,687,564	971	‡
1901–1910	8,795,386	49,642	.6
1911–1921 †	6,541,039	249,762	3.8

* Report of Commissioner General of Immigration, 1927, pp. 190–191.
† Eleven years.
‡ Less than one tenth of one per cent.

The foregoing table shows that the immigration from Mexico prior to 1911 was relatively unimportant. During the ten years 1901–1910, only six-tenths of one per cent of the total immigration into the United States was from Mexico. But during the eleven fiscal years, 1911–1921, the number of Mexican immigrants was 249,762, or 3.8 per cent of the total number of 6,541,039 immigrants admitted into the United States. The rush of immigrants from Mexico began during the World War and was undoubtedly caused by the then prevailing shortage of labor.

Although the Mexican immigration began during the World War period, the great influx of immigration from Mexico was caused by the passage of the quota laws. In the following table are presented the figures of immigration during the three fiscal years 1921–1922, 1922–1923, and 1923–1924, that is, for the period during which the 3 per cent quota law was in operation.

When examining the figures in Table II it should be borne in mind that during the eleven years preceding the enactment of the 2 per cent quota law the number of Mexican immigrants admitted was only 3.8 per cent of the total immigration. As is shown in the table, this percentage increased to 10.9 during the three fiscal years ended June 30, 1924. The shutting off of immigration from European countries undoubtedly gave an added impetus to immigration from Mexico.

TABLE II

NUMBER AND PER CENT MEXICAN ALIEN IMMIGRATION INTO THE UNITED STATES OF THE TOTAL ALIEN IMMIGRATION INTO THE UNITED STATES DURING THE THREE FISCAL YEARS, 1921–1922, 1922–1923, AND 1923–1924

Fiscal years ended June 30	Total number of immigrants admitted into the United States	Total number of Mexican immigrants admitted into the United States	Per cent Mexican immigrants of total immigrants
1922	309,556	18,246	5.9
1923	522,919	62,709	12.0
1924	706,896	87,648	12.4
Total	1,539,371	168,603	10.9

In Table III are presented data showing the increase in Mexican immigration in relation to total immigration into the United States for three fiscal years since the 2 per centum quota restriction law took effect.

TABLE III

NUMBER AND PER CENT OF MEXICAN ALIEN IMMIGRATION OF THE TOTAL ALIEN IMMIGRATION INTO THE UNITED STATES DURING THE THREE FISCAL YEARS 1924–1925, 1925–1926, AND 1926–1927

Fiscal years ended June 30	Total number of immigrants admitted into the United States	Number of Mexican immigrants admitted	Per cent Mexicans of total
1925	294,314	32,378	11.0
1926	304,488	42,638	14.0
1927	335,175	66,766	19.9
Total	933,977	141,782	15.2

An examination of Table III shows that the proportion of Mexican immigration to the total immigration increased from 11.0 per cent in 1925 to 19.9 per cent in 1927. During the three fiscal years ended July 1, 1927, the Mexican immigration was 15.2 per cent of the total immigration.

Table IV shows the annual numerical and percentage increases or decreases in Mexican immigration from the fiscal year 1921–1922 to the fiscal year 1926–1927 inclusive. This table shows, in another way, the effect of the 2 and 3 per cent quota laws. The greatest increase in the number of Mexicans admitted under the 3 per cent quota law was in 1924. During this year the increase over the preceding year was 39.8 per cent. During the next year, which was the first year of the operation of the 2 per cent law, the number of Mexicans admitted decreased by 55,270, or 63.1 per cent, as compared with the preceding

year. This sudden decrease is undoubtedly due to the fact that 1925 was the first year following the adoption of the visa requirements and the visa fee of $10. The number of alien Mexicans admitted into the United States increased in 1926 and again in 1927. In the latter year the number admitted was 66,766, or 56.6 per cent greater than in the preceding year. In view of the pending legislation in Congress to restrict Mexican immigration it is likely that immigration from that country will continue to increase rapidly over preceding years.

TABLE IV

NUMBER AND PER CENT OF INCREASE OR (–) DECREASE IN THE NUMBER OF ALIEN MEXICAN IMMIGRANTS ADMITTED INTO THE UNITED STATES FROM 1922 to 1927, BY FISCAL YEARS

Fiscal year ended June 30	Number of immigrant Mexican aliens admitted into the United States	Increase or (–) decrease over preceding year	
		Number	Per cent
1922	18,246	.....	.....
1923	62,709	44,463	243.7
1924	87,648	24,939	39.8
1925	32,378	–55,270	–63.1
1926	42,638	10,260	31.7
1927	66,766	24,128	56.6

The number of persons born in Mexico and residing in the United States at each census year from 1870 to 1920, and the number and per cent of increase from decade to decade, are shown in Table V. It will be seen that in 1870 the number of persons born in Mexico enumerated by the United States census of that year was 42,435. This number increased each decade until, in 1920, there were 486,418. The total increase in the number of Mexicans in the United States between 1900 and 1910 was greater than the total number of Mexicans who resided

TABLE V

NUMBER AND PER CENT OF INCREASE IN THE FOREIGN POPULATION OF THE UNITED STATES BORN IN MEXICO, FROM 1870 to 1920, BY DECADES *

(Computed from United States Census Data)

Decades	Total number	Increase over preceding decade	
		Number	Per cent
1870	42,435	.....	.....
1880	68,399	25,964	61.2
1890	77,853	9,454	13.8
1900	103,393	25,540	32.8
1910	221,915	118,522	114.6
1920	486,418	264,503	119.2

* Department of Commerce: Statistical Abstract of the United States, 1926, p. 32.

in this country in 1900. Likewise, the total increase in the number of Mexicans in the United States between 1910 and 1920 was greater than the total number of Mexicans who resided in this country in 1910.

From July 1, 1920, to June 30, 1927, seven fiscal years, the total number of immigrant alien Mexicans admitted into the United States was 339,988. The number of emigrants during the same seven years was 24,453, so that the net increase in the number of immigrant aliens, not considering deaths, was 315,535. This number added to 486,418, the number reported by the census in 1920, gives a total of 801,953 Mexican residents in the United States in 1927. But since the total of 801,953 does not take into account the illegal entrants, or the non-immigrants who decided not to return to their native land and remained in the United States, the actual number of Mexicans now in the United States is undoubtedly in excess of one million. In his 1926 annual report, the Commissioner General of Immigration said: "In view of the very considerable number of Mexican aliens presumed to be illegally in this country, it is safe to say that over a million Mexicans are in the United States at the present time, and under the present laws, this number may be added to practically without limit." [1]

Table VI shows the distribution of Mexicans in the United States at the census years 1900, 1910 and 1920.[2]

It will be observed that the preponderant majority of Mexicans were in the states of Texas, California, and Arizona in each census year. In 1900, 93,320, or 90.3 per cent of the total number of Mexicans in the United States were living in these three states. In 1910, this proportion decreased to 85.0, and in 1920, to 82.7. But, while the percentage residing in these three states of the total Mexicans declined slightly from 1910 to 1920, the *number* of Mexicans living in Texas, California, and Arizona in 1910 was 188,697 and in 1920, 402,178, an increase of 213,481, or 113.1 per cent.

It will be noticed also that while in 1900 the proportion of Mexicans residing in Texas was 68.7, in 1910 this ratio declined to 56.3, and in 1920, to 51.8. The proportion of the total Mexicans in the United States residing in Arizona remained practically the same from 1900 to 1920. But the number of Mexicans living in California in 1900 was 8,086, or 7.8 per cent of the total living in the United States. In 1910 this proportion rose to 15.2, and in 1920, to 88,771, or 18.2 per cent. From these data, therefore, it appears that California has been getting

[1] *Annual Report of the Commissioner General of Immigration*, 1926, p. 10.

[2] The figures in Table VI refer to foreign population in the United States born in Mexico. They do not distinguish between persons born in Mexico who do not belong to the Mexican race. Neither do these figures distinguish between naturalized Mexicans, alien Mexicans, immigrant or non-immigrant Mexicans. These distinctions are not important for the purposes of this study.

a disproportionate share of the total Mexican immigration into the United States.

TABLE VI

NUMBER AND PER CENT DISTRIBUTION OF FOREIGN POPULATION IN THE UNITED STATES BORN IN MEXICO, BY PRINCIPAL STATES OF RESIDENCE AND BY DECADES, 1900–1920 *

(Computed from United States Census Data)

State of residence	1900		1910		1920	
	Number	Per cent of total	Number	Per cent of total	Number	Per cent of total
Total	103,393	100.0	221,915	100.0	486,418	100.0
Texas	71,062	68.7	125,016	56.3	251,827	51.8
California	8,086	7.8	33,694	15.2	88,771	18.2
Arizona	14,172	13.7	29,987	13.5	61,580	12.7
New Mexico	6,649	6.4	11,918	5.4	20,272	4.2
Kansas	71	.1	8,429	3.8	13,770	2.8
Colorado	274	.3	2,602	1.2	11,037	2.3
Oklahoma	134	.1	2,744	1.2	6,884	1.4
Illinois	156	.2	672	.3	4,032	.8
Missouri	162	.2	1,413	.6	3,411	.7
New York	353	.3	555	.2	2,999	.6
Iowa	29	†	620	.3	2,650	.5
Nebraska	27	†	290	.1	2,611	.5
All other states	2,218	2.2	3,975	1.9	16,574	3.5
Total number in Texas, California and Arizona	93,320	...	188,697	...	402,178	...
Per cent in Texas, California and Arizona of total in United States	....	90.3	....	85.0	....	82.7

* From United States Census, 1920, Vol. 2, p. 727.
† Less than one tenth of one per cent.

That the Mexican immigrant is drawn toward California in increasing numbers is also shown in Table VII. A study of this table shows that the proportion of Mexican immigrants who declared California as their state of "intended future permanent residence" has been steadily increasing. In the three years from 1909 to 1912, this per cent was 3.8, but in the three years from 1924 to 1927, this ratio increased to 17.0. During the same period the proportion of Mexican immigrants who declared Texas as their state of intended future permanent residence decreased from 83.6 in 1909–1912 to 64.3 in 1924–1927. Of the total number of immigrant alien Mexicans entering the United States during 1909–1912, 8.1 per cent declared Arizona to be their state of intended future permanent residence. This proportion increased to 19.2 in 1915–1918 and declined to 10.7 in 1924–1927.

The index numbers presented in Table VII demonstrate in another way that California has become the Mecca for an ever-growing number of Mexicans. Taking the three years 1909–1912 as the base period, it will be noticed that the number of immigrant alien Mexicans who declared California their state of intended future permanent residence

increased 1,305 per cent by 1924–1927, as compared with 312 per cent for Arizona, 140 per cent for Texas, and 449 per cent for all other states.

TABLE VII

IMMIGRANT ALIEN MEXICANS ADMITTED INTO THE UNITED STATES DURING THE FISCAL YEARS 1909–1927, BY STATES OF INTENDED FUTURE PERMANENT RESIDENCE, BY THREE-YEAR PERIODS

Three-year periods (July 1 to June 30)	Total United States		Arizona		California		Texas		Other states	
	Number	Per cent of total	Number	Per cent of total	Number	Per cent of total	Number	Per cent of total	Number	Per cent of total
Total	513,518	100.0	59,337	11.6	60,801	11.8	354,343	69.0	39,037	7.6
1909–1912	52,135	100.0	4,233	8.1	1,973	3.8	43,585	83.6	2,344	4.5
1912–1915	46,044	100.0	6,420	13.9	2,579	5.6	34,423	74.8	2,622	5.7
1915–1918	44,629	100.0	8,573	19.2	3,217	7.2	27,114	60.8	5,725	12.8
1918–1921	97,488	100.0	9,021	9.2	10,100	10.4	69,823	71.6	8,544	8.8
1921–1924	110,558	100.0	13,647	12.3	15,210	13.8	74,756	67.6	6,945	6.3
1924–1927	162,664	100.0	17,443	10.7	27,722	17.0	104,642	64.3	12,857	8.0

INDEX NUMBERS—NUMBER ADMITTED IN 1909–1912=100

1909–1912	100	100	100	100	100
1912–1915	88	152	131	79	112
1915–1918	86	203	163	62	244
1918–1921	187	213	512	160	365
1921–1924	212	322	771	172	296
1924–1927	312	412	1,405	240	549

Table VIII also shows that the increase of Mexicans in California from 1900 to 1910 and from 1910 to 1920 was greatest as compared with the increases in Arizona and Texas during the same two decades.

TABLE VIII

NUMBER AND PER CENT OF INCREASE IN THE FOREIGN POPULATION BORN IN MEXICO RESIDING IN THE STATES OF TEXAS, CALIFORNIA AND ARIZONA, 1900–1920

State of residence	Number in 1900	Number in 1910	Number in 1920	Increase 1900–1910		Increase 1910–1920	
				Number	Per cent	Number	Per cent
Texas	71,062	125,016	251,827	53,954	75.9	126,811	101.4
California	8,086	33,694	88,771	25,608	316.7	55,077	163.5
Arizona	14,172	29,987	61,580	15,815	111.6	31,593	105.3
Total	93,320	188,697	402,178	95,377	102.2	213,481	113.1

Thus, between 1900 and 1910 the percentage of increase in the Mexican population of California was 316.7, whereas between 1910 and 1920 this percentage of increase was 163.5.

Tables VI, VII and VIII show that California has had an increasing number of the Mexican immigrants as compared with the states of Arizona and Texas. But Table VII shows that during the three fiscal years ended June 30, 1927, the percentages of Mexicans designating Arizona, California and Texas as the states of their intended future permanent residence were, respectively, 10.7, 17.0 and 64.3. It is interesting and pertinent to inquire whether the Mexican immigrants actually remain in the states of their intended future permanent residence.[1]

It would appear from the data given in Table IX that Mexican immigrants find their way from Texas into California.

TABLE IX

States of residence	Number in 1910 United States Census	"Intended future permanent residence" of Mexicans in 10 years, 1911–1920	Possible maximum total in 1920	Actual number in 1920 United States Census	Difference between possible number in 1920	
					Number ($d-c$)	Per cent $\left(\frac{e}{c}\right)$
	(a)	(b)	(c)	(d)	(e)	(f)
Arizona	29,987	25,761	55,748	61,580	+ 5,832	+10.5
California	33,694	16,864	50,558	88,771	+38,213	+75.6
Texas	125,016	146,578	271,594	251,827	− 19,763	− 7.3
Total	188,697	189,203	377,900	402,178	+24,278	+ 6.4

Thus, according to United States Census data the number of persons born in Mexico and residing in California in 1910 was 33,694. Between 1911–1920, ten years, 16,864 immigrant alien Mexicans declared that California was their state of intended future permanent residence. Assuming that they all entered the United States through California and that they all remained there, then the possible maximum number of Mexicans in California in 1920 could not have been in excess of 50,558. But instead of this number the census of 1920 counted 88,771 Mexicans in California, which is 38,213 or 75.6 per cent greater than the possible maximum total that could be expected in California in 1920, when the census was taken.[2] The foregoing tabulation also

[1] The *Reports of the Commissioner General of Immigration* classify immigrants according to state of "intended future permanent residence" and "ports of entry." In the case of the Mexican the port of entry is practically synonymous with the state of intended future permanent residence, that is, the Mexican immigrant generally declares as his state of intended permanent residence the state through which he enters the United States.

[2] Column (c) in Table IX entitled, "Possible maximum total in 1920," could more properly be labeled "Impossible maximum total in 1920," for the reason that the figures in this column do not make allowances for the emigrating Mexicans from the respective states or for the deaths of Mexicans during the ten years 1911–1920. The difference between the possible maximum total and the actual number in 1920 is much greater than 38,213 for the state of California. The same observations apply to Arizona. It is assumed in this tabulation that the census enumeration of Mexicans in 1910 and in 1920 were equally accurate.

shows an excess of 5,832 for the state of Arizona and a shortage of 19,767 for the state of Texas. Although these data are by no means exact, they nevertheless strongly suggest that the Mexicans filter from Texas into California and that in the process of filtration many settle in New Mexico and in Arizona.[1]

Numerous and diverse estimates have been made as to the number of Mexicans at present living in California. The fact is that there is no accurate information available on this subject and probably no reliable data will be had on this point until the results of the next decennial census are published by the Bureau of the Census of the United States Department of Commerce. In the meantime all estimates as to the number of Mexicans in the United States or in California, in the absence of an actual enumeration, must be more in the nature of guesses. It would be unwise and thoroughly fallacious to attempt to estimate the number of Mexicans residing in California at the present time by adding the total or net immigration into California to the total number of Mexicans who resided in California in 1920.[2] These figures would not account for migrations from Texas or other states into California, or for migrations from California into other states.[3]

Perhaps the safest method of estimating the number of Mexicans now residing in California is to assume that the percentage of increase in the Mexican population in this state between 1920 and 1928 has been the same as between 1910 and 1920, namely, 163.5 per cent. Since the Mexican population in 1920 in California was 88,771, an increase of 163.5 per cent between 1920 and 1928 would place the number of Mexicans in California in 1928 at 233,912. Another estimate, equally without very sound basis, would be to ignore Mexican emigration and to assume that of the total number of 339,988 immigrant alien Mexicans admitted into the United States between 1921–1927, seven years, 18.2 per cent landed in California.[4] Estimated on this basis the total number of Mexicans in California in 1927 was in the neighborhood of 150,649.

Table VI shows that the proportion of Mexicans residing in California increased steadily during the years 1900–1920, and that in 1920, 18.2 per cent of the total number of Mexicans in the United States were in that state. It is safe to assume that about one fifth of all

[1] Table VIII shows that in 1910 the number of Mexicans in New Mexico was 11,918, whereas in 1920 it was 20,272, an increase of 8,354, or 70.1 per cent.

[2] Data on net increase in population due to excess of immigration over emigration are not published by the Commissioner General of Immigration for individual states, and are, therefore, not available for California.

[3] The migrations of Mexicans from California into other states is probably very negligible.

[4] Table VIII shows that of the total number of Mexicans in the United States in 1920, 18.2 per cent were in California.

Mexicans now in the United States live in California. Since it is estimated that there are in the United States over 1,000,000 Mexicans, it seems quite fair to assume that over 200,000 are in California at the present time. Although these estimates may appear bold and as overstatements of fact, they are nevertheless more likely to be understatements. The fact that only a very small number of Mexicans return to their native land and that thousands of them move into California from Texas and probably many more from Arizona, as well as the undeniable fact that a very large number of Mexicans enter California illegally, would seem to justify the guess that between 200,000 to 250,000 Mexicans now reside in the state of California.

NOTES

ANOTHER ATTEMPT TO EXPLAIN MULTIPLE CORRELATION IN SIMPLE TERMS

By Bradford Bixby Smith

Probably the greatest obstacle to a more general understanding and use of multiple correlation is the forbidding aspect of its mathematical presentation. The correlation concepts are, however, of a simple and straightforward nature, and though the steps in the procedure may be detailed and tedious, they are arithmetical rather than mathematical in nature, and are neither frightening nor difficult. If the statistician chanced to believe that commodity prices and interest rates were forecasters of general business conditions he would probably try by and by to combine the two factors into one index that would be a better forecaster than either factor by itself. The problem would be one of determining what weights would be best to use in constructing the index. Multiple correlation is merely a method of determining *what the best possible weights would be,* and to this end more than ninety per cent of the labor in working out a multiple correlation problem is devoted. When the weights have been found they are customarily called "net regression coefficients," or "net regressions." Clearly the concept is less difficult than the name. After the index has been constructed, by using the net regressions as the weights for combining the two series, the curious statistician is likely to correlate this index with the index of general business he is trying to forecast. If he does determine the coefficient of correlation between the forecasting index and the general business index, he has computed a Pearsonian Coefficient of Multiple Correlation, for this is all it is: the coefficient of correlation between a group of factors combined with "best weights" and another, the *dependent,* factor. In a sense, multiple correlation is but index making, with two objectives: first, to determine the best weights for use in combining the several variables, the *independents,* into a single index; and, secondly, to measure by the coefficient of correlation how well the index estimates or forecasts that variable, the *dependent,* which it was designed to estimate or forecast.

To determine the weights to be used is thus the first step. In actual practice this step flowers into a number of little steps. To those who

forget the simple objective these steps may be confusing; but to those who retain the concept well in mind the steps are but an orderly sequence. The method of determining the weights is the method of least squares. Though this is a name to conjure with, the procedure is quite straightforward. First, in order to avoid a confusion which occasionally arises, it should be understood that weights, or regressions, may be either positive or negative in sign; or some may be positive and some negative when a number of variables are combined. Then, too, it is statistical experience that before determining the weights to be used, all the variables should first be expressed as deviations from their respective averages. A fluctuation of a hundred million dollars in bank deposits may be of considerable significance in financial forecasting, but if this fluctuation is buried in a total of some fifty billions the weighting would be much distorted. The familiar expression of variables as deviations from trend is a form of recognition of this necessity.

The several variables which are to be combined, therefore, are listed down in columns side by side, and the figures listed are the plus or minus deviations of the variables from their respective averages. The independent variables may be designated, for convenience, by the letters, A, B, . . . N. The last column on the right should be designated X, and should show the values of the dependent variable in terms of deviations from its average. The objective, it should be recalled, is to determine a weight for the A series, which may be designated as b_a until its value is determined, a weight, b_b, for the B series, and a weight, b_n for the N series. These weights should be such that when the values of A, B, . . . N on a given line in the table are multiplied by them and cross-added together, the resulting sum will agree as closely as possible with the X value listed on the same line.

To determine these weights the values in the A column should be squared and summed. The sum may be designated ΣA^2. Then the A items are multiplied by the corresponding B items and the products added to secure the sum, $\Sigma(AB)$. In similar fashion all the sums indicated in the compartments of the systematic little diagram below are determined.

	A	B	.	.	N	X
A	ΣA^2	$\Sigma(AB)$	.	.	$\Sigma(AN)$	$\Sigma(AX)$
B	$\Sigma(AB)$	ΣB^2	.	.	$\Sigma(BN)$	$\Sigma(BX)$
.	.	.	.	.	.	.
.	.	.	.	.	.	.
N	$\Sigma(AN)$	$\Sigma(BN)$	.	.	ΣN^2	$\Sigma(NX)$

The letter combinations in the compartments are the combinations of the corresponding column and row designations. The combinations appearing below the diagonal—the sums of squares—terms are duplicates of those above. Obviously these need not be computed twice. Some of these product sums may prove to be negative, others positive.

After the numbers for filling in the diagram have been determined, they are used in forming simultaneous equations—the *normal* equations. There are as many lines in the diagram as there are weights to be determined. From each line one equation is formed. The equations are:

$$\begin{array}{lllll} b_a\Sigma A^2 & +b_b\Sigma(AB) & . & +b_n\Sigma(AN) & =\Sigma(AX) \\ b_a\Sigma(AB) & +b_b\Sigma B^2 & . & +b_n\Sigma(BN) & =\Sigma(BX) \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ b_a\Sigma(AN) & +b_b\Sigma(BN) & . & +b_n\Sigma N^2 & =\Sigma(NX) \end{array}$$

This may look a little complicated at first glance, but the actual equations, of course, would appear less confusing, for positive or negative numbers would replace all the symbols except b, which are the unknowns. Note that the numbers which are the coefficients of b_a in the equations are all indicated in the A column of the diagram, the coefficients of b_b in the B column, etc. The simultaneous solution of these equations, by any method the statistician cares to employ, determines, of course, the values of the unknowns, the weights, b_a, b_b . . . b_n. By this procedure is accomplished the first objective of multiple correlation as it has been here outlined.

The weights having been determined, the index may be forthwith constructed, the data still being used as deviations from average. The index, X', correlated with the X values, yields the coefficient of multiple correlation which is customarily designated, $R_{x.abc\ldots n}$. It might also be designated, $r_{xx'}$.

In principle this is about all there is to multiple correlation procedure. There are, however, six important methods of reducing the labor, which any one who actually works any extended problem through in the manner above described will heartily welcome.

(1) The numerical quantities indicated in the diagram are computed from deviations from average. As a matter of fact these product sums and sums of squares may all be computed directly from the original series without these series first being expressed as deviations from average. To find the sum of the squares of deviations from average in a series, ΣA^2 in the diagram, for example, the original items may be squared and summed, and from this sum should be subtracted the product of the mean of the series times the sum of the series. If M

denotes the mean and $\bar{A}$ the original series, then, $\Sigma A^2 = \Sigma \bar{A}^2 - M\Sigma\bar{A}$. In a similar fashion the several product sums of deviation from average may be computed from the original series by subtracting from the sum of the products of the original items the product of the mean of either series times the sum of the other.

$$\Sigma(AB) = \Sigma(\bar{A}\bar{B}) - M_{\bar{a}}\Sigma\bar{B}, \text{ or}$$
$$= \Sigma(\bar{A}\bar{B}) - M_{\bar{b}}\Sigma\bar{A}.$$

(2) When the items in the original series are large and cumbersome to multiply, they may be made smaller without affecting the correlation result materially. This process may be termed "coding." The series may be coded first by subtracting a number as large as the smallest item from every item in the series. If the remaining numbers are still too large to multiply easily, they may be further reduced in size by dividing through by a constant which will result in the largest quotient being about 30 in magnitude, the quotients, of course, being rounded off. Numbers up to 30 in size are not difficult to multiply. Neither the deduction of a constant from a series nor the division by a constant will materially affect the correlation result.

(3) When there are a large number of items in each series the process of cross-multiplication can be simplified by coding the data and using punch card equipment. One card is punched with data for each month or each year, as the case may be. By means of this equipment all the similar values of the $\bar{A}$ series, for example, can be brought together in the sorting machine into one pack of cards. By squaring the value and multiplying by the number of cards in the pack, and by doing this for each pack and adding the results, the sum of the squares of the $\bar{A}$ values can be quickly obtained. While the cards are sorted into packs according to the values of $\bar{A}$, the values of the $\overline{B}$ series in each pack can be added on the tabulating machine and then multiplied by $\bar{A}$. This obviously gives the same result as multiplying each $\overline{B}$ value times the $\bar{A}$ value and then adding the results. Doing this for each pack and then adding the results gives the sum of the products of $\bar{A}$ and $\overline{B}$, $\Sigma(\bar{A}\overline{B})$. The other product sums and sums of squares are similarly secured. There is probably no greater time saver in multiple correlation procedures than this.[1]

(4) After the coded data, $\bar{A}$, $\overline{B}$, . . . $\overline{N}$, $\overline{X}$, are listed down in columns side by side, ready for punching on the cards or for direct multiplication, a final column, headed "Check Sum," or "S," may be added.

[1] For detailed description of this procedure with appropriate forms and complete numerical example see *Use of Punch Card Equipment in Multiple Correlation* (Mimeographed), Bureau of Agricultural Economics, 1924.

In this column on each line is listed the cross-sum of all the other values on that line. $\bar{A}+\overline{B}+\ +\overline{N}+X=S$. Multiplying $\bar{A}$ by itself and by each of the other values on a line and cross adding the products should then obviously equal $\bar{A}$ times S. And, similarly, $\Sigma\bar{A}^2+\Sigma(\bar{A}\overline{B})+\ +\Sigma(\bar{A}\overline{N})+\Sigma(\bar{A}\overline{X})=\Sigma(\bar{A}S)$. Therefore, when making the multiplications involving the $\bar{A}$ series, if $\bar{A}$ is also multiplied by S and summed, this product sum, $\Sigma(\bar{A}S)$ will serve to check all the computations in securing the product sums involving the $\bar{A}$ series. In similar fashion, $\Sigma(\bar{A}\overline{B})+\Sigma\overline{B}^2+\ +\Sigma(\overline{B}\overline{N})+\Sigma(\overline{B}\overline{X})=\Sigma(\overline{B}S)$ and so on. As a matter of fact this check sum serves to check the arithmetic of the procedure clear through the solution of the normal equations.

(5) Normal equations, being symmetrical equations, are susceptible to solution by a specific and time-saving method—the Doolittle Method. For those who expect to do considerable work of this type it is desirable to learn this method.[1] Otherwise any standard method will serve.

(6) In order to obtain the multiple correlation coefficient it is not necessary to square all the $\overline{X}'$ values, determine the standard deviation, and obtain the product sum of $\overline{X}'$, with $\overline{X}$. It is necessary only to multiply each regression coefficient after it has been obtained by the product sum of the variable it belongs with and $\overline{X}$, add the products and divide by $\Sigma\overline{X}^2$. Taking the square root gives the correlation coefficient,[2]

$$R^2_{x.ab\ldots n}=\frac{b_a\Sigma(\bar{A}\overline{X})+b_b\Sigma(\overline{B}\overline{X})+\quad+b_n\Sigma(\overline{N}\overline{X})}{\Sigma\overline{X}^2}.$$

[1] The Doolittle Method was described in this JOURNAL, December, 1927.

[2] For detailed explanation of this and other multiple correlation theorems see *Correlation Theory and Method Applied to Agricultural Research* (Mimeographed), U. S. Bureau of Agricultural Economics, 1926.

THE POPULATION OF AN AREA AROUND CHICAGO AND THE LOGISTIC CURVE[1]

By Raymond Pearl and Lowell J. Reed

In the December number of this Journal Ardis T. Monk and Helen R. Jeter[2] published an interesting paper discussing the application of the logistic curve to the population of a defined area which is called "the Chicago region." The results obtained by these authors lead them to regard the logistic prediction for 1950 as less good than those made by various public service corporations. They further conclude, however, that (p. 376) "the data here examined warrant no conclusions with regard to the general validity of the logistic curve as a law of population growth," and go on further to say: "While this behavior of the curve should not in itself discredit the method in general, nor even in this particular case, it is apparent that certain characteristics of the population of this region prevent the application of a logistic."

It seems worth while to discuss a little further the position which we believe to be correctly taken in the last sentence quoted.

The basic difficulty arises from the fact that the populations of the various constituent areas of the defined "Chicago region" *are growing at quite diverse rates.* This is apparent if one studies the very excellent and detailed presentation of the statistical facts which has been given by Miss Jeter in another publication.[3] The "Chicago region" is made up of the city of Chicago, on the one hand, and a number of still highly rural counties on the other hand. The rates of population growth are widely different, as would be expected, in the different parts of this area.

Now we have shown elsewhere[4] that the summation of two logistics is not, in general, a logistic unless the rates and points of inflection of the component logistics are approximately the same. This condition is plainly not met by the several constituent elements of the population of the defined Chicago "region." The truth is that this "region" is an artificial one, in any other than a topographic sense. Its population, considered as a whole, is not biologically, sociologically, nor economically a homogeneous one. On the contrary, it is a highly heterogeneous one, as is clearly demonstrated by the data given in Miss

[1] From the Institute for Biological Research and the Department of Biometry and Statistics of the School of Hygiene and Public Health, Johns Hopkins University.

[2] Monk, A. T., and H. R. Jeter, "The Logistic Curve and the Prediction of the Population of the Chicago Region," this Journal, December, 1928, pp. 361–385.

[3] Jeter, H. R., *Trends of Population in the Region of Chicago.* The University of Chicago Press. 1927.

[4] Reed, L. J., and R. Pearl, "On the Summation of Logistic Curves," *Journal of the Royal Statistical Society,* Vol. 90, pp. 729–746, 1927.

Jeter's publication cited. But to attempt to fit a single logistic to the combined population of the whole region is to assume implicitly that the several constituent population elements in the region are approximately like each other, at least in respect of their rates of growth and points of inflection. Since they are demonstrably not so, any attempt to fit a single logistic to the combined population would be expected, *a priori*, to result in a curve of little or no value for purposes of extrapolation.

We have tried the experiment of dividing the area roughly into two parts—(a) the city of Chicago, and (b) the rest of the defined "region." If these two parts are independently fitted with logistics and the results added, the resulting prediction for the population of the whole defined "region" in 1950 is somewhat over six million, a result in reasonable accord with the predictions made in other ways, as, for example, by the public service corporations. We have made no attempts to fit these curves accurately because, in our opinion, the data do not warrant the labor, for the reasons which have been stated.

The skew logistic in Monk and Jeter's paper is obviously a poor fit. The reason for this rests in part in the method of fitting employed, which was the determination of K from fixed points. The probable error of K is too great to make such a method satisfactory.

This point, however, is of minor importance in comparison with the main fact that the population of the Chicago "region" as a whole is too diversified and heterogeneous to warrant summation of logistics, and yet not sufficiently large to lead to statistical compensation of the diversification.

A REGISTRATION AREA FOR SOCIAL STATISTICS

An attempt to establish a "registration area" for social statistics from which comparable monthly reports will be received from all social agencies is under way at the University of Chicago. This Registration of Social Statistics is the direct outgrowth of a study made in 1924 by Mr. Raymond Clapp of the Cleveland Welfare Federation and published for private circulation under the title "Volume and Unit Cost of Social Work in Nineteen Cities." Mr. Clapp's work demonstrated clearly that most social agencies could furnish accurate statements of income and expenditure, but that very few of them could supply statements of quantity of service rendered that could be compared from city to city.

The Association of Community Chests and Councils, which had coöperated in Mr. Clapp's undertaking, resolved to carry his work further. Throughout the country budget committees and directors of chests were asking for information upon which to base decisions. "We often are obliged to allot funds and to coordinate programs of social work largely by guesswork," they said, in effect, "and we need some kind of reliable guide."

This insistent demand for trustworthy statistical material with regard to the volume of social work induced the Association of Community Chests and Councils, after further experimentation in 1926, to embark in 1928 on a new effort, under different direction and with new methods. The Local Community Research Committee of the University of Chicago was invited to participate in the undertaking and to contribute both to its support and to the formulation and control of policies. A joint advisory committee composed of four community chest directors and five members of the faculty of the University of Chicago was organized and the details of the work were placed under the immediate direction of two members of the faculty of the Graduate School of Social Service Administration, with a staff of four assistants.

In the two earlier ventures, the figures had been gathered at the end of the year; in 1928 data were reported monthly and the chief emphasis was laid upon perfecting the monthly reports in order to achieve comparable results before the end of the year. Simple schedules were developed that sought to obtain the essential measures of the case load of the social agencies, both public and private, that deal with problems of delinquency, dependency and illness. These three general fields were subdivided into twenty-four special fields, such as family welfare, hospitals, and medical social service.

Twenty-nine cities, as widely separated as Denver and Newark, Minneapolis and New Orleans, are coöperating in the registration. A total of 2,235 reports is due each month, 1,829 being the largest number received in any one month up to November, 1928. Each agency was also asked to submit a report at the end of the year covering its income and expenditure.

The committee in charge of the registration reached several important conclusions during the year. The members no longer regard the task as a one-year job, to be undertaken whenever there is fresh demand for statistical data; they have come to look upon the undertaking as a continuing one that has as its objective a permanent statistical service to social workers not unlike that rendered to public

health officials by the Bureau of Vital Statistics. With this new conception of its task the committee is now thinking of issuing a series of brochures, one in each of the twenty-four fields in which statistics are being gathered. These brochures would set forth completely a simple statistical system for each type of agency, starting with the original entry and leading up to the assembling of the figures for monthly and annual reports. This work, if undertaken, will be carried out in co-operation with a committee from the national society in each field concerned.

The registration area has been slightly enlarged for 1929. In addition to the twenty-nine cities participating in 1928, eight new cities were invited to coöperate. If the work attains the scope and the usefulness the committee envisages for it, a day will eventually come when it cannot be carried on under private auspices.

A. W. McMillen

INTEREST RATES AND SECURITY PRICES

A dinner meeting of the American Statistical Association was held on Thursday evening, October 25, 1928, at the Aldine Club, 200 Fifth Avenue, NewYork City. One hundred forty-five persons were present. The meeting was ably presided over by Dr. W. Randolph Burgess, Assistant Federal Reserve Agent of the Federal Reserve Bank of New York City.

The evening was devoted to a discussion of "Interest Rates as Determinants of Security Prices," with special emphasis upon the question as to whether interest rates are a dominant force, or whether their influence is relatively slight.

The first speaker of the evening was Mr. James Hughes of the Chase Securities Corporation. He presented a series of charts to show that between 1900 and 1923 practically all of the bull markets began and ran most of their course while commercial paper rates were below 5 per cent, and that, in every case except one, no major break occurred until interest rates had risen above 5 per cent, the one instance out of eight occurring in 1916–1917 when the market broke originally because of fear of the results of President Wilson's Peace Note and later continued to decline during 1917 largely because of fear regarding the result of the war. In 1918 the market turned and prices moved up, culminating in the great market of 1919. During this period, interest rates were above 5 per cent, but the average yield on industrial stocks remained well above these rates until the latter part of 1919.

In the other seven major swings, bull markets occurred in periods of low interest rates and bear markets, in time of high interest rates.

Recently, the assertion has been freely made that 1924 marks the beginning of a new era and that hence the old rules no longer apply. There can be no question but that since 1923 we have had the greatest bull market in history. It may be worth while to note, however, that we have also had the longest period of easy money rates in our history. At present, however, we have had 5 per cent rates on commercial paper for four months and the market has not yet declined. Heretofore, except for the one instance in war time, stock prices have not continued to advance, in the face of commercial paper rates, above 5 per cent for more than

three months. One must, however, be wary about assuming that this additional month proves that conditions have entirely changed.

Mr. Hughes laid down the following rules in an attempt to demonstrate that in practice it would have been possible for speculators and investors to profit by following literally the theory that interest rates indicate major trends of security prices, waiving as among the imponderables the question whether interest rates *dominate* such prices:

1. Buy good stocks when the average dividend yield of the Dow-Jones list of stocks rises from a position below commercial paper rates to a point 1 per cent above.
2. Sell when the average dividend yield of the Dow-Jones list of stocks drops below the rate on commercial paper. This rule has yielded satisfactory results in every case except during the war market of 1916.

The speaker explained that it is not always justifiable to assume that because condition A precedes condition B, condition A is the cause of condition B. It is, perhaps, true that commercial paper rates do not cause security price movements, but only indicate a more fundamental combination of circumstances that are the underlying cause of such movements. The indications are that the causal relationship is as follows: Up to 1924 interest rates were usually low when surplus funds from business were seeking investment, and high when business was using all available funds. Bull markets occurred, as a rule, when business was dull and bear markets, when business was booming. Before 1924 the supply of bank credit in the United States was ordinarily not large enough to finance at the same time both business prosperity and a stock market boom. Since 1924, however, the credit supply, as efficiently administered by the Federal Reserve System, has been adequate to keep business activity at a high level and also to underwrite the greatest bull market in history.

In reply to questions raised Mr. Hughes stated that it was true that in certain instances the relationship between interest rates and turning points of the stock market was not so close as might be desired. The fact remained, however, that interest rates had been a correct guide 87 per cent of the time since 1900. He felt, therefore, that under such circumstances whenever the stock market is not following the course indicated by the level of interest rates, the student of the market must follow its technical action more carefully than ever in order to detect indications of a possible change in its major trend.

The second speaker of the evening was Dr. Charles O. Hardy, of the Institute of Economics, Washington, D. C. He laid emphasis upon the question of whether interest rates determine security prices even if they forecast such movements. He pointed out that whereas the speculator is interested in forecasting, the government is interested in regulation. The real point of issue from the standpoint of government is whether a change in interest rates will affect the movements of security prices.

In Dr. Hardy's view the charts presented by Mr. Hughes were far from furnishing conclusive evidence that commercial paper rates actually controlled the

movements of security prices. There were so many exceptional periods as to make even the supposed forecast of little value to the speculator or investor. Evidently there is some connection between interest rates and the movements of security prices, but the chart can be used just as well to show that when security prices rise they pull interest rates up, as to show that a rise in interest rates affects the prices of the securities.

Booms in business usually lead to high interest rates and also to high stock prices, but stock prices normally rise first. The difficulty in ascertaining the relationships between interest rates and security prices lies largely in the fact that since 1900 we have had, during most of the time, cyclical waves of approximately equal length. Under such circumstances it is obviously extremely hard to say which variable is preceding the other. Evidence from earlier periods when cycles were less uniform indicates that the lag of interest rates behind stock prices is much more uniform than the reverse lag.

Dr. Hardy presented data concerning a large number of stocks held by an investment trust company. These figures, when charted, indicated that from 1923 to 1927 total dividends and total stock prices have paralleled each other closely. During this period dividend payments have risen much more rapidly than have earnings, while the trend of interest rates has been upward for over four years. The prices of a stock must be determined by (1) the present dividend rate; (2) prospective changes in dividend rate; and (3) current interest rates.

Dr. Hardy next presented a chart to show that dividend yields of the Standard Statistics Company's list of stocks and the interest yields of the Standard Statistics Company's list of bonds have been running about parallel since 1923. So far as can be discovered, however, the relationship between commercial paper rates and stock prices is extremely vague. Of course, low interest rates do tend to increase the income of the majority of corporations. A study of the figures concerning corporations presented in the Federal *Statistics of Income* shows, however, that this factor, although important in the case of public utilities, is of but little significance to industrial corporations. It must be remembered that at present many of the great industrial corporations are lenders rather than borrowers, and in such instances high interest rates make for large rather than small profits.

The two papers were discussed by Dr. Frederick R. Macaulay, of the National Bureau of Economic Research of New York City. He called attention to the difficulty of reasoning out logically the relationship between fluctuations in business or in the prices of stocks and fluctuations in interest rates. While admitting Dr. Hardy's contention that in some cases it is difficult to tell which is cause and which is effect, the speaker felt that this difficulty was not nearly so serious as Dr. Hardy asserted. In his opinion the safest course is to plot the variables (after smoothing) and base conclusions upon the empirical relationships revealed, rather than upon abstract logic. It is usually reasonably safe to assume that lags are short rather than long. Since the various waves differ considerably in length and likewise in shape, it seems feasible to decide by inspection which variable tends to precede the other. This, of course, does not establish any causal

relationship. Although there are exceptions to the rule, a study of the data since 1857 indicates rather conclusively that the following sequence of variables is the normal one: (1) call money rates inverted; (2) time money rates inverted; (3) commercial paper rates inverted; (4) bond prices; and (5) stock prices.

The relations are much more apparent between adjacent variables than between distant ones. For example, the relation between call money rates and stock prices is much less apparent than the relation between bond prices and stock prices. Moreover, the various interest rates series are much more closely related to bond prices than they are to stock prices. Perhaps the most valuable information can be gained by considering all five variables together, even though the sequences are sometimes a little irregular and though a whole wave may sometimes be missing in one of the variables. Since 1857, for example, four waves are missing in the case of stock prices.

Dr. Macaulay presented a series of charts showing frequency distributions of the lags between the different pairs of variables. In most instances these frequency distributions showed a wide scatter, but as a rule the modes seemed reasonably well defined. One seems justified in assuming that as the lag becomes longer than the mode of time, the probability that the movement in the second variable will normally follow that of the first becomes greater and greater. According to the sequences of the five variables, a downward movement of the stock market has been delayed well beyond the modal lag. Unless the relations between the series prove to be decidedly unusual, a downward movement in stock prices should begin before the end of 1928 or very shortly thereafter. Any such forecast must, however, Dr. Macaulay warned, be taken with caution, since in at least four instances since January, 1857, the stock market has failed utterly to follow the indications given by the other four variables.

The meeting adjourned.

W. I. K.

BANK CREDIT AND THE SECURITY MARKET

On December 6 a meeting of the American Statistical Association was held at the Aldine Club, 200 Fifth Avenue, on the topic "Bank Credit and the Security Market." Because of the illness of Dr. Willford I. King, the presiding officer was Colonel Leonard P. Ayres, of the Cleveland Trust Company, former president of the Association. About 350 members were present.

The first speaker, Dr. David Friday, discussed the recent expansion of bank credit and took the position that the traditional theory of credit was not adequate to explain the extraordinary expansion of bank loans and investments and deposits since the year 1922. This expansion has amounted to more than 50 per cent and under any of the accepted theories of credit might have been expected to cause large increases in commodity prices or other evidences of inflation. Nevertheless, prices have not risen. In Dr. Friday's opinion the explanation of this phenomenon is that banks are now doing a business never contemplated by the old theory of credit. Only 40 to 45 per cent of bank resources are now employed

in commercial banking. The balance of their business is in substance the business of investment trusts.

The second speaker, Mr. Edward S. Rothchild, president of the Chelsea Exchange Bank, in dealing with the outlook for money rates predicted that rates during the coming year would remain firm and would, on the whole, be liable to rule at 6 per cent or higher. He based this prediction upon the belief that the speculative market would require continuously large amounts of money, that business prosperity would continue to absorb funds, and that gold exports might also be expected to continue.

Mr. Robert Warren, of Case, Pomeroy and Company, spoke on gold stocks, reserves, and the supply of credit. His conclusion was that there was no statistical evidence of a prospective world shortage of gold, though such a shortage may perhaps take place. His own belief was that the presumption was rather stronger that the world would find itself with more gold than it could easily employ. In his opinion the outcome depended largely upon the policies adopted and changes in national customs. Mr. Warren based his conclusions, first, upon an analysis of the stock of gold, indicating that the limiting factor upon the indefinite continuance of gold production from the Rand at something like present figures appeared to be taxation by the government of South Africa. He then traced the changes in the distribution of gold throughout the world, showing how the ratios of gold to currency and currency to credit varied from country to country, depending upon varying policies or customs. In discussing the utilization of the available stocks of gold, he quoted Cassel's computation that the world would require an expansion of money of about 3 per cent a year in order to maintain prices at present levels. Although the annual increase in the stock of gold is now only about 2 per cent a year, Mr. Warren did not believe that this necessarily indicated a shortage of gold, partly because of the much more economical utilization of gold in recent years owing to the custom of not using gold as currency, and partly because of further possible economies in gold utilization which may be in prospect.

Mr. Norman Merriman, of S. Ungerleider and Company, in discussing the relation of brokers' loans and credit expansion made a careful analysis of the character of brokers' loans and other loans on securities. He found that, adding together the total reported brokers' loans and the loans made on securities by banks, it now seems probable that the total of all such loans is approximately 15¼ billion dollars in the United States, which is equivalent to from 25 to 30 per cent of the banking resources of the country. This large figure did not seem to him alarming in comparison with the volume of securities outstanding and with such other bank loans as loans on real estate. Analyzing the safety of these various types of security loans he concluded that brokers' loans were the strongest because they carried the obligation of a broker and a customer in addition to the collateral. Loans to dealers were a little less strong because they carried only the obligation of the dealer. Loans to customers were probably least strong, particularly in the case of small banks, many of which would not have officers trained to distinguish the value of different kinds of collateral. He believed that loans for account of others represented largely funds awaiting investment. Placing these funds in

the market did not reduce a bank's lending power but rather increased it and thus was an influence toward easier rather than firmer money. He believed that these loans could be largely increased in amount.

Mr. Kenneth Steere, of Paine, Webber and Company, and Mr. Rollo Rife, of the Guaranty Trust Company, in discussing the papers were both optimistic about the future trend of security prices.

R. W. B.

PROGRESS OF WORK IN THE CENSUS BUREAU

PREPARATIONS FOR THE DECENNIAL CENSUS

At this writing the bill for the next census has been favorably reported by the Senate Committee but with a change in the date of the census from May 1, 1930, as it was in the bill as passed by the House, to November 1, 1929. Readers of the JOURNAL will perhaps recall that the question of the date was discussed in the December issue, and that it was there pointed out that the fall of the year was probably the best season for a combined census of population and agriculture.

The fate of the census bill will be decided before this issue of the JOURNAL is printed. The bill came up for consideration just before the Christmas recess but was held up by one of the senators, who was opposed to passing a census act unless Congress would provide for a reapportionment of representatives. If the bill gets safely by this snag, there may be difficulties in reaching an agreement between the House and Senate as regards the date. If the bill should finally fail of passage at this short session, the Bureau of the Census will have to fall back upon the Act of 1919, which would hamper its work very greatly, necessitating a complete change of program, and the sacrifice of everything that would be gained by the proposed revision of the law. It is to be hoped that no such misfortune will befall the Fifteenth Census of the United States.

Meantime with the prospect that the date for taking the census may be advanced six months, the Bureau is hastening its preparations for the task. It is dividing the country into districts suitable for the purposes of the enumeration, and is planning the organization of an army of 100,000 or more enumerators. The divisional commander in this army is the supervisor. In the census of 1920 there were 372 supervisors. This time it is proposed to increase the number to 546 so that the number of enumerators under each supervisor will not be so large as it was before. In cities the supervisor as a rule will have about 200 enumerators to look after. In New York City instead of four supervisors as there were in 1920 there will be 14 according to the present plans. The size of the enumerator's district has to be determined with respect to the requirement of the law that the enumeration shall be completed within two weeks in cities and within one month in rural districts. Probably in the cities the population of an enumerator's district will average about 2,000. The enumerator's district in rural regions normally covers a larger area and a smaller population. But the rural enumerator must collect data for the farms as well as for the population.

One difficult problem is that of adjusting the pay of enumerators to the varying

conditions in different districts. The enumerators are paid on a piece-price basis, so much per capita of population and so much per farm; and in the last census (1920) many enumerators earned as little as one, two, and three dollars a day, while others in the same supervisor's district earned as high as eight, nine, and ten dollars. In general the range of earnings was too low at the last census, making it difficult to obtain competent enumerators. The price ought to be sufficient to insure a fair day's pay for a fair day's work, and must, therefore, be adjusted with regard to the number of farms and families which the enumerator can be expected to canvass in a day, allowing for the density or sparsity of the population, condition of roads, and other factors. With a view to ascertaining what the conditons are in the various localities the Bureau is addressing a circular letter of inquiry to some person in every township, borough, or other minor civil division in the United States, not including, however, cities of over 25,000, the list of persons addressed being supplied for all civil divisions in each county by some county official. Incidentally it is expected that it will be of no slight advantage for the Bureau thus to establish contact in advance of the census with some presumably influential and intelligent citizen in every community.

A great deal of study is being given to formulating the schedules and designing the punch cards. It is proposed at this census to carry all the population data on a single card instead of punching a separate card for the occupational data as was done in 1920. This will effect a considerable saving in the total time and total expense of the tabulation without involving any loss in the completeness of the result or the amount of detail that may be tabulated.

The population schedule according to present plans will not include as much detail as was carried on that schedule in 1920. It is proposed to omit the question relating to mother-tongue, which required three columns on the 1920 schedule, the question as to the year of naturalization, and the question as to whether employer, employee, or working on own account. On the other hand, one or two new questions may be added. It is probable that there will be a question as to number of rooms on the schedule for one or more of the principal cities, and that the women home housekeepers or home makers will be distinguished in the occupation column or in some other way. These proposed changes were carefully considered and were approved by the Census Advisory Committee at its meeting last December.

J. A. H.

MISCELLANEOUS NOTES

The Columbus Chapter.—Two meetings of the Columbus Chapter of the Association were held during the fall quarter. The first of these was held at the Faculty Club, Ohio State University, on November 21, with an attendance of twenty-six at the dinner meeting. In addition some fifteen or twenty persons attended the discussion. A round table on the subject "Statistics and Research" had been arranged for the occasion.

At the discussion, more than a dozen university departments were represented, the purpose of the meeting being to make possible a rapid exchange of views with regard to the usefulness of statistics in research. Some high lights of the discussion follow.

A member of the Department of Anthropology said that the difficulty of defining units and of collecting sufficient quantities of comparable data made the statistical method very nearly useless in the field of cultural anthropology, although the method was being used extensively in the work of physical and psychological anthropologists. A member of the Forestry Department then explained how the statistical method was being used by government experts to secure reliable samples of forest areas. The representative of the College of Agriculture pointed out that statistics were extensively used in soils experimentation, and also in weather and crop forecasting.

The use of statistics in the field of economics and business was illustrated by exhibits from the University Bureau of Business Research. A member of the Department of Psychology showed how methods of measurement had been developed which made possible the statistical analysis of data formerly thought not to be amenable to such treatment.

A sociologist sounded a warning against the use of statistics when statistical arguments were not relevant to the point under discussion. Statistics might, he thought, be used for the purpose of giving a false show of exactness in argument. A chemist pointed out that whereas statisticians are concerned largely with average values and dispersion, the engineer is more frequently concerned with limits. It is not sufficient that the parts of a bridge be strong enough on the average; the weakest part must be strong enough to withstand any strain that may be put upon it.

At the dinner meeting of December 7, held in Pomerene Hall on the campus, Dr. Truman L. Kelley of Stanford University was guest and speaker of the evening. He spoke on the general subject of statistics as an instrument of thought. Inasmuch as Dr. Kelley had delivered an entire series of lectures and held daily conferences on the campus during the five days immediately preceding his address before the statisticians, his generous response to a request to speak before the chapter was highly appreciated.

Annual Dinner Meeting of the Washington Statistical Society.—The annual dinner meeting of the Washington Statistical Society was held on December 14, President William M. Steuart presiding. In addition to about fifty members of the Society, the meeting was attended by the members of the Census Advisory Committee, then in session in Washington, and other guests.

Dr. Ethelbert Stewart, Commissioner of Labor Statistics, read a paper on "New Employment Statistics," which was later discussed by LeVerne Beales, of the Bureau of the Census. Miss Mary van Kleeck, director of the Department of Industrial Studies of the Russell Sage Foundation, discussed the work of the American Statistical Association's Committee on Governmental Labor Statistics in their coöperation with various governmental organizations.

President W. M. Steuart, director of the Census, discussed the plan for the census

of 1930, describing some of the problems that have presented themselves in connection with this work. Dr. Steuart was followed by Mr. W. S. Rossiter, chairman of the Census Advisory Committee, and Professors R. E. Chaddock and W. F. Willcox, members of the same committee, who talked on various phases of census work.

At a short business session following the dinner, Thomas B. Rhodes was appointed to act as secretary of the local chapter in place of Dr. Woodlief Thomas, who is in Europe on an official mission.

Meetings of the Chicago Chapter.—On October 30 the meeting of the Chicago Chapter was held at Auditorium Hotel. The chairman was Mr. Robert B. King of the Illinois Bell Telephone Company. The speaker of the evening was Mr. Harper Leech, financial columnist of the *Chicago Tribune*. His wide contacts as financial writer have given him an unusual opportunity to observe the trend in the use of statistical information and to predict probable future developments. He spoke informally about the developments in our present-day civilization which have caused the world to become statistical-minded. His keynote was that "statistics is more than a method of computation. It is a symptom of a gradual change in the mode of thinking and of a change in emotions." The meeting was well attended. Plans for the future organization and activities of the Chicago Chapter were discussed.

On December 4 another dinner meeting was held. The general topic was "Methods of Forecasting Corn Prices." Mr. Nat C. Murray, statistician for Clement Curtis and Company, spoke on "The Comparative Importance of the New and Old Corn Crops." "The Long Time Trend" was the subject of the paper given by Professor L. J. Norton, of the University of Illinois, and "The Change in Corn Prices from December to May," the topic of Mr. R. W. Longstreet, of Swift and Company. The papers were very well received and a lively round-table discussion took place after the speakers had finished. About fifty members and guests were present. Among the latter were Mr. O. C. Stine and Mr. W. F. Callander, both of the Bureau of Agricultural Economics.

The Austin Chapter.—The Chapter met on October 24 to discuss "Cycles in the Livestock Industry." The main paper was by Mr. George M. Lewis, livestock specialist in the University of Texas Bureau of Business Research. Mr. Lewis's paper was based primarily on an analysis of the livestock industry in Texas and in the Southwest. The discussion was led by Mr. H. H. Schutz, state statistician for the United States Bureau of Agricultural Economics. Twenty-eight were present.

The Chapter met again on December 19, Dr. Vincent W. Lanfear, professor of Finance and director of the down town division of the University of Pittsburgh, made the principal address, on "The Influence of Economic Research in the Field of Business." Professor E. L. Dodd led the discussion. Twenty-three were present.

The Detroit Chapter.—About forty members and guests attended a meeting of the Detroit Chapter in the Statler Hotel on December 12. Mr. Henry G. Weaver, assistant to the director, Sales Section, General Motors Corporation, Detroit, gave the meeting the results of his most recent study on "The Future of the Automobile Industry." In addition to the excellent new material which Mr. Weaver has succeeded in producing throughout the year in which he has been working on this study, his address was notable for the method of graphic presentation which he had developed for his work. Use of five sizes of typewriter letters, special lenses to suit any size and age of audience, and other interesting features were explained by Mr. Weaver and Mr. DuBrul as one of the most important corollaries to the work being done in

the General Motors Corporation. Two winter meetings were planned for the tentative dates, January 16 and March 13.

United States Bureau of Labor Statistics.—During the quarter under review the Bureau of Labor Statistics has completed the field work on its wage studies of the automobile, hosiery, and underwear industries. The results will be published in the *Monthly Labor Review* in the near future. The next major wage investigations will cover bituminous coal, oil wells, and pipe lines. Work will begin early in the year.

A special study has recently been made regarding the relative costs of material and labor in building construction. The results show the proportional importance of labor and material in different types of building, by occupations and by class of work.

An investigation is being carried on regarding the hazards of spray painting, now so much used in industry, and a similar investigation is under way regarding poisoning to workers from the use of radium and radio-active substances in the making of illuminated watch dials and other products. Both of these studies should be ready for publication early in the year.

An extensive field survey of labor productivity in merchant blast furnaces over a period of years has been completed and a preliminary report was published in the *Labor Review* for December, 1928.

Meeting of the Joint Advisory Committee.—The Joint Advisory Committee of the American Statistical Association and the American Economic Association to the Director of the Census met in Washington, Friday and Saturday, December 14 and 15, 1928, at the invitation of Director Steuart. The sessions of the committee were devoted to consideration of the population and agricultural schedules for the 1930 census. The items on both schedules were carefully scrutinized and a number of changes were recommended with the object of improving the accuracy and increasing the usefulness of the census results. All members of the committee were present. The representatives of the American Statistical Association were W. S. Rossiter, chairman, W. I. King and R. E. Chaddock. The representatives of the Economic Association were G. E. Barnett, G. F. Warren and W. F. Willcox.

Hoover Elected to Institute.—At the recent election of new members to the International Statistical Institute, the Secretary of Commerce and President-elect, Mr. Herbert Hoover, was chosen as an honorary member. It is almost unprecedented to elect as an honorary member one who was not already a regular member. The election was in recognition of Mr. Hoover's valuable work as Secretary of Commerce in improving the quality and extending the range of American official statistics.

In the statement about candidates which was sent to members at the time of the election by correspondence, the following opinion of an American member was quoted:

> My intimate acquaintance with the statistical work of the federal government for thirty years justifies me in saying that no government officer in my day has contributed so much to uplift and dignify the work of professional statisticians in the United States as Mr. Hoover since 1921, when he became Secretary of Commerce and was thus in charge of the Bureau of the Census and of the Bureau of Foreign and Domestic Commerce.

Each candidate must be supported by at least five members. In the case of Mr. Hoover, the five members were the President of the Institute, two of the three Vice-Presidents, the Treasurer, and the other American honorary member, Dr. Hadley. The nomination was made by one Frenchman, one German, one Englishman and two Americans.

Committee on Population of the National Research Council.—The basic adhering bodies for the United States to the International Union for the Scientific Investigation of Population Problems are the National Research Council and the Social Science Research Council. For some time past both of these councils have had Committees on Population. The Committee on Population of the Social Science Research Council, under the chairmanship of Professor Walter F. Willcox, has been actively at work. The corresponding Committee of the National Research Council has hitherto been only a small one, existing principally for administrative reasons. Recently this committee has been enlarged, and now it includes the following members:

O. E. Baker, U. S. Department of Agriculture
Isaiah Bowman, American Geographical Society
Leon J. Cole, University of Wisconsin
E. G. Conklin, Princeton University
C. B. Davenport, Metropolitan Life Insurance Company
E. M. East, Harvard University
W. H. Frost, Johns Hopkins University
James W. Glover, University of Michigan
Robert A. Harper, Columbia University
Ellsworth Huntington, Yale University
Alfred J. Lotka, Metropolitan Life Insurance Company
Lowell J. Reed, Johns Hopkins University
Edgar Sydenstricker, Milbank Memorial Fund
Alonzo E. Taylor, Stanford University
T. Wingate Todd, Western Reserve University
Edward M. Wentworth, Armour's Livestock Bureau
Raymond Pearl, Johns Hopkins University, chairman

Some Studies by the Milbank Memorial Fund.—The impairments of adult ages are the subject of a statistical inquiry which has been conducted by the Division of Research, Milbank Memorial Fund, during the past year, upon which several reports are to be issued in the next few months. The data consist chiefly of the records of medical examinations that were placed at the disposal of the Milbank Fund by the Life Extension Institute. The basic tabulation of 100,000 of these records, made by approximately 9,000 physicians, has been completed in considerable detail. The study is under the immediate direction of Mr. Rollo H. Britten, who made a similar study of 10,000 male industrial workers for the United States Public Health Service in collaboration with Doctor L. R. Thompson. Mr. Britten's work supplements the study by Dublin, Fiske and Kopf upon about 17,000 examinations of the Life Extension Institute. Age and general occupational status of the persons examined are included in the present study as well as different types of examinations made.

A statistical study of the fertility of native white married women of native parentage in the United States has been begun by the Division of Research, Milbank Memorial Fund. The material used for the study is being extracted from the original enumeration sheets of the 1910 census and includes data relating to the age, duration of marriage, number of children and industrial and social status of husband for each of approximately 100,000 women selected from a considerable number of urban and rural localities. The inquiry is under the immediate direction of Dr. Frank W. Notestein, who is assisted by an Advisory Committee.

The Pacific Collegiate Economic and Commercial Conference.—At the Seventh Annual Meeting of the Pacific Collegiate Economic and Commercial Conference, held at Berkeley, California, on December 27 and 28, certain papers of primarily statistical interest were delivered. They were: "The Relation of Accounting and Statistical Methods," by Ira N. Frisbee of the University of California at Los Angeles;

"The Function of Statistics in Business Management," by John M. Rae of the University of Oregon; and "Regression Patterns in Earnings and Expenses," by H. Secrist of Claremont College. There was discussion of the first paper by H. R. Hatfield and J. R. Riggelman, and of the last two, by N. J. Selberling and D. E. Faville.

Meat and Meat Products Consumption Subject of Survey.—The consumption of meat and meat products is being studied by the University of Chicago. The aim is to arrive at consumer attitude as reflected in quantities purchased at changing prices, and the motives and habits directing this choice, as a basis for a constructive merchandising plan. The study as outlined includes (1) an analysis of tendencies of consumption of the various products over periods of years; a measurement of the elasticity of demand; tendencies in the substitution of food articles; variations by localities, nationalities, etc.; (2) relation of prices to quantities consumed; and (3) analysis of consumer habits and motives, covering such problems as prejudices and variations by localities, sex, age, occupation, race, nationality, creed, and response to the advertising of meat products and substitutes.

A sub-project is a survey of the Pittsburgh meat trade, with particular reference to sources of meat in the Pittsburgh area, the Pittsburgh livestock market, wholesale and retail distribution, consumer habits and preferences, fluctuations in consumer demand, and social-economic factors in various districts. A second sub-project considers packages and containers as factors in the retail distribution of meat in Pittsburgh. The University of Pittsburgh is undertaking the last two projects.

A Study of Employment Fluctuations in Pennsylvania.—The Pennsylvania Department of Labor and Industry has recently published a study of employment fluctuations in Pennsylvania. This report was prepared by Mr. J. Frederic Dewhurst, of the Philadelphia Federal Reserve Bank, and covers the period 1921 to 1927.

PERSONAL NOTES

William Sidney Rossiter

William S. Rossiter, president of the Rumford Press, and former chief clerk of the Bureau of the Census, died in Concord, N. H., on January 23, 1929. He was born in Westfield, Mass., September 9, 1861. Following his graduation from Amherst College in 1884, he was assistant to the business manager of the *New York Tribune* until 1888; chief of the circulation department of the *New York Press* from 1888 to 1889; and business manager of the *New York Graphic* from 1889 to 1890. In 1889 he organized the New York Printing Company, of which he was treasurer and manager from 1890 to 1898. From 1898 to 1900 he was in business in New York City as publisher of real estate atlases and other special publications.

In 1900 he was appointed as a clerk in the United States Census Office, and was soon after promoted to the position of chief of Division of Publications, and later to that of chief clerk. In 1908 he was selected by President Roosevelt to investigate the organization of the Government Printing Office, which led to the introduction of a better system of cost accounting and other improvements.

On July 31, 1909, he resigned his position in the Bureau of the Census to accept the vice presidency of the Rumford Press, and he became the president of that corporation in 1916, which position he held at the time of his death.

In 1918 he served in Washington on the Staff of the Central Bureau of Planning and Statistics of the War Industries Board. He was largely instrumental in bringing about the establishment of the Census Advisory Committee, and was chairman of this Committee from its inception up to the time of his death.

In 1924 he received the degree of Master of Arts from his alma mater, Amherst College.

He was a member of the American Statistical Association for many years, and was its president in 1922. He was also a Fellow of the Royal Statistical Society, London.

The works of which he was the author include the printing and publishing of reports for the censuses of 1900 and 1905, *A Century of Population Growth in the United States*, and *The Population Problem of Vermont;* and the Census monograph on *Increase of Population, 1900 to 1920*. He was a contributor to many magazines, among which was the *Atlantic Monthly*.

In recent years he was actively interested in the New England Council, and devoted much energy and time to a study of the rehabilitation of the farming areas of that section.

In 1891 he married Miss Nellie C. Budd of New York. His widow and one daughter, Mrs. Thomas N. Troxell, survive him.

His attractive personality, keen grasp of affairs, and diversified interests in many movements made him influential as a leader among men. Gifted with a ready command of language both in writing and in conversation, he was always sure of a hearing. Enthusiasm in any work which he undertook and loyalty to his friends were marked traits of his character. The staff of the Census Bureau, especially, will miss his cheery manner, sage advice, and helpful coöperation.

J. A. H.

Dr. E. Dana Durand, chief of the Statistical Research Division of the Bureau of Foreign and Domestic Commerce, has been appointed by the Secretary of State as the American delegate at the International Conference on Economic Statistics which will be held in November at Geneva, Switzerland. Dr. J. F. Dewhurst, of the Federal Reserve Bank of Philadelphia, and Dr. Asher Hobson, of the International Institute of Agriculture, were appointed as technical assistants to Dr. Durand.

Dr. Woodlief Thomas has resigned from the staff of the Division of Research and Statistics of the Federal Reserve Board to accept a position with the Agent General of Reparations in Berlin. He succeeds Dr. Jesse Riddle, who resigned to become economic counsel for an investment trust in New York City.

Dr. Morris Copeland, of the University of Wisconsin, has been appointed a member of the Division of Research and Statistics of the Federal Reserve Board.

Professor J. A. Dickey, of the University of Arkansas, and Professor Erich Zimmerman, of the University of North Carolina, will collaborate with the Brookings Institution in a study of Porto Rican economic conditions. Professor John Dickinson, of Princeton University, is giving a series of lectures in the Training Division of the Brookings Institution, and Dr. Max Sasuly has accepted a temporary appointment to complete some studies in statistical theory and statistical method on which he has been engaged for some time.

E. S. Gregg, until recently chief statistician of the Western Electric Company, has been appointed export manager of the Electric Research Products, Inc., a subsidiary of the Western Electric Company, working on devices for the synchronization of sound and pictures. Robert W. Burgess, who has been senior statistician of the Western Electric Company, has been designated chief statistician to succeed Mr. Gregg.

Dr. C. E. McGuire, of the Brookings Institution, has departed for Germany, where he will deliver a series of lectures. Before returning to this country he will make an extended visit to other countries in Europe. Mr. Joseph G. Knapp, who has been on a temporary appointment with the Food Research Department of Stanford University, has now returned to the Brookings Institution.

The statistical research staff of the American Exchange Irving Bank has been strengthened in recent months by the addition of Robert C. Effinger, formerly investment counsellor, Clarence Hammond, formerly assistant treasurer of the Acme Wire Company, and J. H. Leighton, formerly with the statistical division of the American Telephone and Telegraph Company.

Miss Margaret Meyer, formerly with the American Association for Labor Legislation, and Miss Helen May Wheeler have joined the staff of the Brookings Institution as research assistants.

Dr. Frederick H. Newell, industrial engineer—formerly hydraulic engineer, United States Geological Survey, and consulting engineer, United States Reclamation Service—has joined the staff of the Brookings Institution to coöperate in the survey of Porto Rico.

MEMBERS ADDED SINCE DECEMBER 1928

Anderson, C. Arnold, Department of Sociology, University of Minnesota, Minneapolis, Minn.

Armstrong, Charles M., Jr., General Electric Company, 1 River Road, Schenectady, N. Y.

Borden, Howard G., Department of Institutions and Agencies, Trenton, N. J.

Bremer, L. D., 65 Broadway, New York City.

Burtchett, Dr. Floyd F., Department of Economics, University of California at Los Angeles, Los Angeles, Calif.

Carret, Philip L., Executive Head, Economic Research, Inc., 120 Broadway, New York City.

Chawdry, Kailash, Student, Furnald Hall, Columbia University, New York City.

Clark, Ralph N., Standard Statistics Company, Inc., 200 Varick Street, New York City.

Coene, Emil L., Tucker Anthony and Company, 120 Broadway, New York City.

Cohen, Jacques S., Baar Cohen and Company, 50 Broad Street, New York City.

Cohen, Joseph A., A. G. Becker and Company, 100 South LaSalle St., Chicago, Ill.

Cumming, Forrest, Associate Professor of Mathematics, University of Georgia, Athens, Ga.

Cummings, Glenn, Financial Editor, *Detroit Times*, Detroit, Mich.

Day, Bessie B., Victor Talking Machine Company, Camden, N. J.

Duffy, John F., Electric Bond and Share Company, 2 Rector Street, New York City.

Elworth, Theodore F., Investment Securities, Camp, Thorne and Company, Inc., 848–49 South LaSalle St., Chicago, Ill.

Farrell, Arthur F., Student, John Jay Hall, Columbia University, New York City.

Field, Charlotte L., Tanner's Council of America, 41 Park Row, New York City.

Fitz, Esper W., Advertising Department, Sears, Roebuck and Company, Chicago, Ill.

Frame, Prof. B. H., 222 W. Agricultural Building, University of Missouri, Columbia, Mo.

Fuller, Raymond G., State Charities Aid Association, 105 East 22nd Street, New York City.

Gaffney, Mary C., Price Analysis, Armour and Company, Chicago, Ill.

Geiger, Alfred L., Attorney at Law and Certified Public Accountant, 1117 National Press Building, Washington, D. C.

Gokay, O. P., International Telephone and Telegraph Corporation, 67 Broad Street, New York City.

Grimm, Elizabeth, 24 Loomis Avenue, Windsor, Conn.

Gwaltney, Luther L., Investment Banking, White, Weld and Company, 14 Wall Street, New York City.

Hammond, Ralph H., White Motor Company, 842 East 79th Street, Cleveland, Ohio.

Hanau, Dr. Arthur, Dusseldorferstrasse 46, Berlin W. 15, Germany.

Harper, Dr. Roland M., Bureau of Business Research, School of Commerce, University of Georgia, Athens, Ga.

Hawley, John S., General Electric Company, Schenectady, N. Y.

Hill, Rowland B., Jr., Dairy Products Research Bureau, 3–164 General Motors Building, Detroit, Mich.

Hillman, John B., Public Utility, Public Service Terminal Building, Newark, N. J.

Hoag, Pierre, Department of Statistics, Materials and Supplies, Eastman Kodak Company, Kodak Park, Rochester, N. Y.

Holden, Isabel K., Petroleum Research Corporation, 120 Broadway, New York City.

Hunt, Stanley B., Instructor of Statistics, Temple University, Philadelphia, Pa.

Johnson, Norris O., Investment Analysis, Investment Research Bureau, Auburn, N. Y.

Kneeland, Hildegarde, Bureau of Home Economics, United States Department of Agriculture, Washington, D. C.

Koeppe, J. Rowan, Income Tax Consultant, 80 Broadway, New York City.

Kurtz, Albert K., Psychology Department, Ohio State University, Columbus, Ohio.

LeSage, William D., Appalachian Electric Power Company, 1002 Third Avenue, Huntington, W. Va.

Lockhart, Dr. Oliver C., Director, Bureau of Business and Social Research, University of Buffalo, Buffalo, N. Y.

McIntosh, J. R., Investment Securities, 1 Wall Street, New York City.

McKee, Professor Captain W., Department of Economics and Business Administration, Westminster College, New Wilmington, Pa.

McReynolds, Ross A., National Metal Trades Association, 1021 Peoples Gas Building, 122 S. Michigan Avenue, Chicago, Ill.

Meloy, John Y., Jr., Investment Banking, Northern Trust Company, 50 South LaSalle Street, Chicago, Ill.

Meredith, Spencer B., Investment Banking, A. B. Leach and Company, Inc., 57 William Street, New York City.

Miller, Frieda S., Research Bureau, Welfare Council, 151 Fifth Avenue, New York City.

Munn, Glenn G., Security Analysis, Paine Webber and Company, 25 Broad Street, New York City.

Nichol, Archibald J., Student, John Jay Hall, Columbia University, New York City.

Nichols, Bervard, Editor, *Texas Business Review*, Bureau of Business Research, University of Texas, Austin, Texas.

Noyes, Selden G., 20 Union Street, Schenectady, N. Y.

Oliver, E. L., Research Department, Brotherhood of Railway Clerks, 701 Brotherhood Building, Cincinnati, Ohio.

Olson, Carroll L., Statistician for the Reorganized Church of Jesus Christ of Latter Day Saints, Independence, Mo.

Ostrolenk, Bernhard, Lecturer in Finance, University of Pennsylvania, Philadelphia, Pa.

Parker, Sylvia L., Assistant Professor of Poultry Husbandry, University of California, Berkeley, Calif.

Parritt, Charles W., Statistician and Director of Research, Department of Welfare, Commonwealth of Pennsylvania, Harrisburg, Pa.

Podd, George, Student, School of Business, Columbia University, New York City.

Pollard, Lois E., Ortonville, Minn.

Prouty, Nelson H., Director, Institute of Business Science, 1001 Wyoming Avenue, Scranton, Pa.

Reading, E. A., Hardware Mutual Casualty Company, 200 Strongs Avenue, Stevens Point, Wis.

Retallick, Arthur B., Adolph Lewisohn and Sons, 61 Broadway, New York City.

Rist, Leonard B., Investment Banking, Blair and Company, 1, Rue François Premier, Paris, France.

Rubezanin, Milija, Marks and Graham, 32 Broadway, New York City.

Ryan, Dr. Franklin W., Vice-President and Economist, National Cash Credit Corporation, 40 Journal Square, Jersey City, N. J.

Sanders, Henry S., Credit Manager, Public National Bank, 89 Delancey Street, New York City.

Schmidt, Hans W., Telephone Traffic Engineer, The Ohio Bell Telephone Company, 750 Huron Road, Cleveland, Ohio.

Schulz, Arthur K., Assistant Comptroller, Chase National Bank, 18 Pine Street, New York City.

Schwartz, George, Student, New York University, Washington Square, New York City.

Schwartz, Louis, Student, New York University, Washington Square, New York City.

Sell, Charles J., General Statistical Division, Western Electric Company, 195 Broadway, New York City.

Seltzer, Dr. Lawrence H., College of the City of Detroit, Cass and Warren Avenues, Detroit, Mich.

Shoemaker, James W., Sales Statistics, Chase Securities Corporation, 60 Cedar Street, New York City.

Siegbert, Henry, Adolph Lewisohn and Sons, 61 Broadway, New York City.

Simonds, Alvan T., President, Simonds Saw and Steel Company, 470 Main Street, Fitchburg, Mass.

Simpkins, John J., Fellow, Bureau of Statistical Research, School of Commerce, Accounts and Finance, University of Denver, Denver, Colo.

Sinclair, John F., Financial Writer, 1905 Paramount Building, New York City.

Spahr, Prof. Walter E., School of Commerce, New York University, Washington Square, New York City.

Stockton, John R., Professor of Statistics, Coe College, Cedar Rapids, Iowa.

Taylor, Eustace L., Arthur Anderson and Company, 67 Wall Street, New York City.

Thomas, Sydney F., International Telephone and Telegraph Corporation, 67 Broad Street, New York City.

Thompson, John G., Simonds Saw and Steel Company, 470 Main Street, Fitchburg, Mass.

Thorne, Wendell E., International Telephone and Telegraph Corporation, 67 Broad Street, New York City.

Valenta, Frank, Security Analysis, Shearson, Hammill and Company, 71 Broadway, New York City.

Veenstra, Theodore A., Bureau of Business Administration, University of Michigan, Ann Arbor, Mich.

Wagenet, Elizabeth M., Judson Health Center, 237 Thompson Street, New York City.

Wagoner, Anna Jo, Bureau of Business Research, University of Detroit, Six Mile Road at Livernois, Detroit, Mich.

Warner, Joseph R., Research, 61 Broadway, New York City.

Welch, Blanche E., Holyoke, Mass.

Welch, Emmett, School of Business Administration, University of Pittsburgh, Pittsburgh, Pa.

Wigeland, Andrew E., Statistician, The National Bank of the Republic, Chicago, Ill.

Wilkes, William C., Investment Banking, Guaranty Company of New York, 140 Broadway, New York City.

Wille, John J., Botany Worsted Mills, 200 Fifth Avenue, New York City.

Wilson, Caroline E., 82 Green Street, Woodbridge, N. J.

Wolf, John G., Investment Banking, A. B. Leach and Company, 57 William Street, New York City.

Zuydhoek, Johanna G., Instructor in Mathematics, Connecticut College for Women, New London, Conn.

DEATHS

Bailey, Dudley P., Everett, Mass. (February, 1928).

Venus, Henry A.,The Mutual Benefit Life Insurance Company, 300 Broadway, Newark, N. J. (October 17, 1928).

Williams, Ellis D., 560 Drexel Building, Philadelphia, Pa. (August 1, 1928).

REVIEWS

Der Sinn Der Indexzahlen, by Gottfried Haberler. Tübingen: J. C. B. Mohr (Paul Siebeck). 1927. 134 pp.

The literature on index numbers discloses two widely divergent views. Some statisticians conceive the index number as an exact instrument. Others are skeptical of being able to measure changes in the value of money or the price level. Mr. Haberler appears to fall in the second group.

Der Sinn Der Indexzahlen is about equally divided into two parts: (1) Examination of some of the mathematics involved in the construction of index numbers and, much more important, (2) the economic implications of the subject. The general thesis is summed up in the foreword. One can only talk of a subjective price level, a subjective purchasing power of money, the price level of an individual person or group. It is impossible to measure the change in price level exactly. The best we can do is to determine the limits within which a true coefficient may be found. These limits are determined on the one hand by Laspeyres' formula and on the other by that of Paasche, the former supplying the upper limit and the latter, the lower. It is common practice among statisticians to take a mean between these two, but since the difference between them is generally not great, one is not much in error no matter which average is chosen. These formulas have further significance for the author in that they meet his major test for ratios of aggregates and are fundamental to the whole mathematical theory of index numbers. Much of Part II is given over to the derivation and discussion of the economic significance of these basic formulas.

The author holds no brief for the geometric mean. He concedes it no advantage by reason of its meeting the base reversal test. Such advantages as it may possess are of purely mathematical, not economic, significance. The circular test is also condemned. He quotes Fisher in pointing out the absurdity of comparing widely separated periods. Fisher's case, however, is far-fetched and thus of little validity. The circular test does not involve the intercomparison of incomparable periods or places. There must be consistency of data between periods in order that a proper index may be calculated. Unless the p's and q's of the periods and places being compared match one another, we are forced to eliminate them from the index. As Haberler says (page 51): "The larger the number of commodities to be eliminated, the more incomplete the comparison." That is quite true, but if all we can achieve is a partial index, then we must be satisfied unless reasonable substitutions can be made. In other words, we are confronted with the practical difficulties in the construction of index numbers, but this cannot be used as a proof against the circular test. The test is of much value in an intercomparison of the price levels of several years. It provides us with a means of judging the trend of the indexes from year to year and makes possible the immediate comparison of any two or more years within the series under scrutiny

without the necessity of the arduous task of recomputation. Following a brief discussion of chain index numbers, the usual question as to what is the best index number is raised.

In his *Making of Index Numbers*, Fisher advocates two tests: the time reversal test and the factor reversal test. Haberler supports neither test, because the first, in and of itself, is insufficient as a criterion of a good index number, and the second has no economic basis and indeed rests on a fiction. The question is raised: "Has it any economic meaning . . . to say which part of the change is ascribable to a change in price and which to a change in quantity?" The author believes very strongly that there is none. Prices and quantities are dependent parts of one and the same phenomenon. Both p and q change in consequence of a change in quantity. The separate influence of either cannot be determined. It is impossible to permit first one factor to vary and then the other. We have here a direct challenge to the theory of an unequivocal price or quantity index and to the use of constant or fixed weights in the construction of index numbers. "They (price and quantity) cannot (separately) influence the total situation because they *are* the total situation." The circular test is also rejected as a criterion because it involves the use of fixed quantities.

Mr. Haberler, then, rejects the formal mathematical concept of most theories of index numbers. They offer no solution of the problem. The author finds no test considered affording a satisfactory criterion. The factor reversal test is rejected on the grounds of its susceptibility to manipulation for the purpose of evolving a temporal symmetry and a consequent meeting of the circular test.[1] While no answer is given by the author to this question of the choice of a best index number, he indicates that it must be sought according to other principles. The line of further investigation is revealed in the fact that an index formula represents a definite complex of commodities. The task is "to inquire if and what conclusions may be drawn from the rise or fall of this or that index, *i. e.*, from the fact that this or that combination of commodities has risen or fallen in price." The combining of this group of commodities is dependent (1) on the choice of prices, and (2) on the choice of formula. He concludes that there is no one best formula.

The economic discussion of the question is divided into five chapters dealing with (1) consideration of methodology; (2) the index of income; (3) the index as a standard of deferred payment; (4) the price index as a guide for monetary policy and the application of the individual price index to the general community; and (5) the price index in the theory of conjuncture.

While conceding that index numbers serve different purposes, the author opposes the prevailing theory that they serve a special purpose of measuring the value of money in addition to the other purposes. "It is quite improbable that a figure computed equally for all these purposes can serve in all cases taken from the same data and from the same mathematical formula. It is not impossible, however, that a solution may be found which will serve every purpose . . . at least approximately. Mitchell speaks in this connection of general purpose index

[1] W. M. Persons, "Note on Fisher's Method of Building up Formulas to Satisfy his Factor Reversal Test," *Review of Economic Statistics*, May, 1928, p. 89.

numbers. . . . It cannot be decided *a priori* when this is the case. When it does happen, we are indebted merely to a statistical accident and not to essential purpose."

In discussing the index of income, the author stresses the need for including only goods of primary importance, consumption goods and services. A separate budget must be constructed for each person. An index of income for the poor, showing an increase in real income because of a fall in the price level owing to a reduction in the price of goods which do not fall within their sphere of consumption, would be pure mockery. Recognizing, however, the difficulties involved in carrying such a concept to its logical conclusion, he concedes that "in practice one must be satisfied with averages for entire classes of the population."

The crux of the theory of index numbers lies in the choice between q_1 and q_2. "Shall we set up our commodity budget according to the consumption of the first or second period, or should we choose a compromise solution?" The answer to this question, he states, depends on a clear conception of what is meant by psychic income (*Realeinkommen*). In order to compare commodity incomes which are made up of heterogeneous constituents and are among themselves non-comparable, we have to appreciate the "common something" which lies behind them. This is psychic income. But the author admits that psychic income cannot be measured by index numbers. It is of course patent that psychic income is not an economic concept. Index numbers are nothing if not objective matters. Psychic income is purely subjective. Moreover, if commodity incomes are the subject matter of index numbers and cannot be measured except through psychic income which is not measurable by index numbers, we seem to be confronted by a logical fallacy which is not resolved by merely decrying the theories of the economists. On the other hand, no one can deny the absolute importance of the psychic factors which lie behind an index number and which must be considered in interpreting and differentiating between the results of statistical methods. Full credit must be given the author for as intelligent a discussion of these matters as may be found anywhere in the literature on the subject. For any one interested in the psychological implications of economics, these pages will certainly repay the reading.

The latter part of the treatise is concerned mainly with the concept of the general price level for any purpose. In any event, when used, the general price index is nothing more than an average of individual indexes. The experience of the United States Bureau of Labor Statistics and the methods of the Harvard Economic Service are cited against its use. Instead, there is increasing utilization of indexes for special purposes. The author concludes with an attack on the methods of the Harvard Economic Service on the ground that too great weight is given to price movements, this despite the fact that much space is given previously to a discussion of the great significance of price movements in the theory of business cycles and crises. Briefly, it would seem that the author, like other writers before him, is reading into the work of the Harvard Committee assumptions concerning causation and the forecast of future price movements that have never been made.

One is impressed, on the whole, with the wide range of information and scholar-

ship possessed by the author concerning the topics in hand. Though brief, the treatment of the various subjects is on the whole fairly comprehensive. Moreover, the style is by no means dry, which is indeed a tribute. For the student of index numbers, he has written a challenging work, particularly on the side of economic and psychological interpretation. Naturally, the treating of controversial subjects involves the making of statements with which one would take issue. On this account, it is to be regretted that the author has shown a spirit of dogmatism. This we consider the most serious drawback of an otherwise excellent piece of work.

MAURICE TAYLOR

Federated Jewish Charities, Boston

British Parcels Prices. Food Research Institute, Wheat Studies, Volume IV, No. 8. Stanford University. 1928. 14 pp.

British Parcels Prices is a bulletin of the Food Research Institute, dealing with a "world price of wheat." It presents a weekly series of wheat prices in England for the six-year period beginning August, 1922, and ending with July, 1928. The purpose in constructing this new price series is to supply "a central representative series for short time comparisons with cash prices in the great wheat-producing and wheat-consuming countries; and for comparisons of cash wheat prices in the world market undertaken to ascertain what particular types and grades are normally premium or discount wheats and how relationships shift from year to year."

The United Kingdom, being the chief importing and re-exporting market in Europe, was selected as the world market, and prices of sales of spot imported wheat delivered at the several ports of this central market were selected to represent the world price.

The term "parcels prices" is derived from the fact that the world price series presented in this bulletin is computed from spot sales of wheat which arrive in the United Kingdom "partly in cargo lots in tramp vessels, partly in 'parcels' in cargo liners, cargo and passenger liners, or tramps," the "parcels" ranging in volume from a few thousand bushels to more than a hundred thousand.

In certain respects the series presented here is comparable with the series that is being computed currently by the United States Department of Agriculture to represent the central cash price of wheat in the United States. The United States series is constructed from reported sales of all classes and grades of wheat sold in six of the leading markets. Each daily average takes into account the number of cars of wheat sold at each reported price. Weekly averages are similarly weighted. The British parcels prices also represent a composite central price for sales at the British ports, chiefly at Liverpool and London, of all classes and grades of wheat, but the daily averages do not take into account the volume of wheat sold at the various prices, data on the volume not being available. The unweighted daily or weekly average of British parcels prices is, therefore, somewhat less representative as a current measure of the composite value of wheat in the British markets than is the domestic series as a measure of the average

value of wheat in the United States. Both series reflect different varieties of wheat as the wheat season progresses. In the United States winter wheat reaches the markets earlier than the spring wheat. Similarly, in the British markets wheat appears in large volume first from one exporting country, then from another.

The reliability of this new world price series for use in its primary purpose, is, however, demonstrated by a comparison of the British parcels prices on a monthly basis with the weighted import value or British customs prices. These two monthly series show practically the same fluctuations, with a lag of about a month in the import or customs prices. This lag suggests that British importers buy mostly on contracts about a month before delivery at the British ports.

The utility of these parcels prices as a standard of comparison for prices of special varieties of wheat to determine whether the latter are at a premium or a discount is illustrated by a series of charts. Here prices of Canadian, American, Australian, Argentine, Indian and domestic (British) wheat are compared with the British parcels prices. Much is made of the fact that these particular varieties deviate from the general average, and certain reasons are given to explain the differences. While the comparisons presented indicate in a general way what varieties bring higher or lower prices than the average, the amount of the premiums or discounts paid is not clearly indicated by this standard price series. This is owing to the fact that the importance of each variety in the general average must vary with the volume of that variety reaching the British market. At one part of the season United States wheat may dominate the arrivals and sales; at another time, Argentine, and later, Canadian. When, for instance, Canadian wheat is on the British markets in great volume, the reported prices must represent largely Canadian wheat. To compare a price series of Canadian wheat with the general average which is made up mostly of Canadian wheat prices is close to comparing something with itself. In such instances it may be more significant, as a measure of premiums or discounts, to compare prices of Canadian wheat, not with the general average, but with prices of competing wheat.

L. H. Bean

Bureau of Agricultural Economics, Washington, D. C.

Wages and Labor's Share in the Value Added by Manufacture, by Jürgen Kuczynski. (Research Series No. 4.) Washington, D. C.: American Federation of Labor. 1928. 224 pp.

The contents of this little book rest upon the reports of the Census of Manufactures issued by the Federal Bureau of the Census between 1904 and 1925. Mr. Kuczynski has selected for his study the 43 manufacturing industries which employed in 1925 more than 30,000 wage earners. These 43 industries are assembled in 14 groups which are nearly the same as the 14 (now 16) groups of industries that are made the basis of some of the tables published by the Census Bureau.

The data presented cover the same census years throughout, these being 1904, 1909, 1914, 1919, 1921, 1923 and 1925. All of the figures are annual, no monthly

data being given. For each of the 14 groups of industries, and for each of the 43 most important industries included within these groups, the following data for each of the seven census years are reprinted from the reports of the Manufactures Census: (1) the number of wage earners, (2) total wages, (3) value added by manufacture. For the same industry groups and individual industries the author reports as "labor's share in the value added" the percentages borne by total wages to value added by manufacture and an "index" of labor's share, the index being a series of relatives based on these percentages. For each of the 14 industry groups, but not for the 43 individual industries, he presents (1) an index of the value added, obtained by dividing the dollar amounts of value added by the value added in 1904, this latter year being used as base or 100 for all relative numbers throughout the book; (2) an index of production of goods; and (3) an index of prices of products. Mr. Kuczynski does not explain how he constructed the last two indexes. Since he states in his introduction that the materials used are "statistics compiled exclusively by the government" (page 8), but does not say whether he has used any other than federal census material, the reader is left somewhat in the dark both as to the sources used and as to the method of treating these sources for the purposes of his present analysis. The reviewer guesses that Mr. Kuczynski rests his index of production upon federal census data, but, since the Census Bureau does not report amounts of products for groups of industries *as groups*, but only separately for numerous individual products within the group, he would have much more confidence in this particular series of relatives did he know just what products were used in the making of the index and how they were weighted. The author presents his index of the prices of products with no adequate explanation of its construction. The only clue given is the statment (page 10) that it is based not on "the total price of the products, but of the price less the costs of materials." It appears, then, that the "price index" has been calculated by dividing the production index by the index of value added. This process would seem to make it less a price index than an index of value added per unit of product.

For each of the 43 individual industries which he covers the author presents some additional data not given for the 14 industry groups. These are (1) money wage income per wage earner, (2) value added per wage earner and (3) real wage income per wage earner. The first two items are derived by dividing the appropriate items by the number of wage earners. The third series is expressed in terms of the purchasing power of the dollar of 1904, the cost of living index used for deflation being Carl Snyder's combination of materials from the United States Bureau of Labor Statistics and the Massachusetts Commission on the Necessaries of Life.

Emphasis throughout the book is laid upon the percentages showing "labor's share in the value added" and upon the index numbers showing fluctuations in that share in the different industries. This emphasis is appropriate in a book prepared under the auspices of, and published by, the American Federation of Labor. The purpose of trade unionism may be said to be, chiefly, to increase "labor's share in the value added." The statistics given in this book were prepared for the use of trade unionists in their efforts to realize this purpose.

The American Federation of Labor is to be congratulated, not only on this careful statistical report by Mr. Kuczynski, but as well on the wise program of industrial research upon which it is now embarked—a program of which Mr. Kuczynski's study is one important result.

P. F. BRISSENDEN

The Fiscal Problem in New York State. New York: National Industrial Conference Board, Inc. 1928. 275 pp.

This publication, as its title implies, deals not alone with taxation but also with public expenditures, borrowing and indebtedness, the interrelation of state and local fiscal policies, etc. Nevertheless, taxation is more discussed than any one of the related topics. The method of treatment is descriptive and statistical, with accompanying observations regarding the desirability or the undesirability of this or that fiscal policy.

The gasoline tax seems to be distinctly favored on the ground that it "covers the principle of making motorists pay according to their use of the roads" (page 203). Nothing is said regarding the use of gasoline for aeroplanes, stationary engines, motor boats, etc. Nor is there any reference to possible inequality of contribution in proportion to benefit received by the users along concrete roads as compared to dwellers along poor dirt roads remote from the principal highways. Those who own and occupy the favored sites enjoy a great differential advantage. Where the occupiers are not owners they can be made to pay, in rent, those who are. But any suggestion that there might be advantage in tapping such rent for necessary public revenue would seem to be foreign to the general point of view of the book.

It is urged that more revenue be derived from the income tax. Because of a belief that the major part of the revenue must come from the great majority of persons of small incomes, and because of a danger that too high a tax on the persons having very large incomes would lead them to take up residence in other jurisdictions (page 184), an increase in the progressiveness of the tax is not advocated. Rather it is suggested that a large revenue might be secured through levying a flat charge or filing fee on persons whose incomes are low enough to be exempt under the present law.

When taxes are levied on incomes from property, nothing is reckoned as income until there is subtracted an allowance for depreciation and obsolescence. Should income on the capital—or what is analogous to capital—invested in human beings be treated in the same way or in a different way? Again, the person who receives an income from capital may, if depreciation is allowed for before taxes are subtracted, receive this income (he and his heirs) in perpetuity. Should enough be allowed from the earnings of labor so that, if this allowed amount were saved and invested, it would provide for a constant annual net income in perpetuity, and should only this net income, with a still further allowance for the current needs of life, be subject to taxation? Or is an income tax to be justified only as supplementary to a tax on property in general or of special kinds, the tax on property being the main source of revenue?

Doubtless discussion of the principles relevant to these questions was no part of the purpose of those responsible for the book. But it is certainly proper to take the present opportunity to insist that any study which does omit considerations of general public policy settles nothing, no matter how complete its informational statistics, except for those whose minds already run parallel to those of the authors (or sponsors) in regard to fundamental taxation principles.

Further evidence that such a study, however accurate may be its factual data, proves nothing at all as to what policy ought to be adopted is furnished by a consideration of some of the comments found in this book regarding the taxation of real estate, especially of land. The report states (page 155) that certain "types of public expenditure directly create private values, upon which the government can draw through special assessments or increased taxes." It is a fact, of course, that not only these government expenditures but, indeed, the whole process of socio-economic development operate to give a differential gain to the owners of favorably situated pieces of land. Whatever the development of a community and however high becomes the value of its land, the value of reproducible goods cannot, if there be no monopoly, in the long run go appreciably above their cost of reproduction. The value of land or sites has no relation to cost of reproduction. But the study before us is as far as one could expect from recommending a special tax on land. Not only are various other taxes urged, chiefly so that real estate may be correspondingly relieved from so much of the burden of supporting government, but the reason for wishing so to spare real estate seems (page 221) to be not a desire to spare *improvements* but to spare *land*, as such.

In any event, whatever the ideal taxation policy may be, its general discovery must wait upon the general understanding of our economic system, of the principles according to which it operates and of its shortcomings. Such an understanding will not fail to discriminate among incomes due to labor serviceable to the community, incomes due to monopoly, incomes derived from the private receipt of community-produced bare-land rent, incomes received in payment for the use of equipment made possible by thrift, and incomes due to chicanery and fraud. Those persons who think of such an analysis and classification of incomes as unimportant, as having no special bearing on the fiscal problems of this or that governmental unit, and those who believe such analysis to be the very foundation of any worth-while inquiry into desirable tax policy are, and are likely to remain, hopelessly apart. Informational statistics that seem to the one group significant may appear to the other as almost entirely, if not wholly, irrelevant.

HARRY GUNNISON BROWN

University of Missouri

The Restoration of European Currencies, by D. T. Jack. London: P. S. King and Son, Ltd. 1927. 218 pp.

Central Banks; A study of the Constitutions of Banks of Issue, with an analysis of Representative Charters, by C. H. Kisch and W. A. Elkin, with a foreword by The Right Hon. Montagu C. Norman, Governor of the Bank of England. London: Macmillan and Co., Ltd. 1928. 384 pp.

Each of the volumes under review is most useful on its informative side. This is true despite the fact that almost a quarter of Mr. Jack's book on the restoration of European currencies is devoted to an introductory chapter on theory. Not only is theory put in the very forefront of the work, but in each of the historical chapters which follow there appear systematic tables of statistics prepared with a view to analytic treatment. The presentation of the theory, however, is merely conventional; and no important use is made of the tables except in the chapter on England. The impression that the material has not been properly digested is enhanced by the tendency of the author to embarrass his text with figures. The opening three or four pages of his chapter on England, for instance, are so overcrowded with figures and dates written out in sentence form that the mind of the reader fairly staggers. But regarded as a series of brief histories of the restoration of currencies in Europe the book has undoubted usefulness. Its brevity is such, to be sure, as to prevent it from being an important contribution even from this point of view. As compared with the League of Nations publications, its chief virtue is merely that it brings the stories down to date; and in this connection it is necessary to note that since the book was written Poland, Italy, Estonia, Norway, Greece, France, and England (in this order chronologically) have completed their monetary reforms.

The volume by Kisch and Elkin on *Central Banks* marks the turning of interest from the restoration of currencies, now largely completed, to the management of the financial systems which have been established. The book is almost unique in its field. Its importance lies chiefly in Appendix I, which covers well over half the book. Here are brought together the laws, charters, and statutes regulating twenty-eight principal banks of issue. These documents are of course translated; and in addition they have been broken up and recombined under analytic headings, a typical set of which runs as follows: (1) purpose of the bank; (2) capital, profits, and reserve fund; (3) branches; (4) management; (5) note issue; (6) reserve; (7) general business; (8) relations with the state; (9) published returns; (10) term of charter. This grouping greatly facilitates the work of comparison. The only drawback is that section numbers which run consecutively in the original law become mixed in the process of recombining. Hence it is difficult to discover just what sections have been omitted as unimportant. Occasionally the omitted sections would seem to be of considerable importance. For instance, in the Reichsbank law, section 31 states that the bank is under obligation to pay its notes to the bearer and that the payment may be made at the bank's option either in gold or foreign exchange. Section 52 states that the coming into force of section 31 requires concurrent resolutions of the Reichsbank Managing Board and of the General Council. These resolutions have not yet

been made and legally the Reichsbank is under no obligation to pay its notes either in gold or foreign exchange. Yet the authors in the process of regrouping the law print section 31 without section 52 which nullifies it. It is possibly as a result of their own rearrangement that in their discussion in the text (page 118) the authors quote article 31 as if it were in full effect.

In general, however, a very high order of judgment has been shown in presenting the bank charters, and the criticisms are exceedingly few. It is unfortunate that since the completion of the book countries of the importance of Italy, France, and England have fundamentally altered their central bank laws.

The text which precedes the appendix contains a brief comparative treatment of the various charters under much the same headings as were employed in regrouping the articles of the charters themselves. The work is soundly done. The chief interest lies in the solution embodied in the charters of the problem of control. Almost every one of them is a charter of a private bank, although the regulation of the community's means of payment might well be considered to be a public function. In money affairs, however, the state is the minister of finance; and such is the temptation for a hard-pressed minister of finance to replenish his treasury by the grant of additional credits to himself that in almost every one of these bank charters a body has been created independent of the state.

The state has, to be sure, usually retained the right to be represented in the management and to exercise certain broad powers of veto. Furthermore, the profit motive which is a potential source of danger in institutions directly responsible to private shareholders has in most cases been curbed by provisions to the effect that earnings above certain specified amounts shall accrue to the state. These checks are real and important. But the fundamental check lies in the gold standard itself. This is the meaning of the gold standard: It is the great instrument by which communities prevent their credit disbursing institutions from doing anything very unwise, even though at the same time they may be kept from following an ideal course in relation to the needs of business. The feeling is strong that they probably lack the banking intelligence to attempt the ideal course and that they do better when they follow pretty closely the rule of thumb of the reserve ratio. In all the bank charters reserve requirements are specified, and in all the more important cases (Italy excepted) definite requirements in gold are imposed. More than three fourths of the gold holdings of the central institutions of the world are thus set aside for use only under exceptional circumstances. The discretion of the central banks is limited to the surplus that remains.

Is it necessary to weave the net of restrictions so close? Americans accustomed to a federal reserve policy developed in recent years almost without reference to reserve ratios may well raise the question.

It is a question, however, which Kisch and Elkin do not attack in any thoroughgoing fashion. Their preoccupation is with a comparison of the charters rather than with the ultimate questions the charters raise. This work of comparison has been done with admirable judgment from the point of view of the best English banking tradition. And for those troubled by further problems there remains the invaluable raw material of the appendix.

Washington, D. C. WALTER R. GARDNER

Consolidated Balance Sheets, by George Hillis Newlove. New York: The Ronald Press Company. 1926. 309 pp.

"This volume attempts to be a working manual on consolidated balance sheet technique. Accordingly 41 rules, supported by very brief discussions and 136 illustrations or cases, are given for use in preparing consolidated statements." The book, thus, consists almost entirely of brief "rules" and a highly organized series of formal examples designed to illustrate the various problems covered by the rules.

In this lack of systematic discussion of fundamental considerations is the book's most serious weakness. Even in a "working manual" there should have been included a fairly full discussion of the general significance of the consolidated balance sheet from both managerial and legal standpoints. Further, such specific matters as the valuation of investments on the holding or parent company's books, the nature of positive and negative "goodwill" as a balancing element in the consolidated statement, and the treatment of intercompany "profits" in inventories, deserve much more thorough analysis and more definite recommendations than are found here. It would not, in fact, have been necessary to set up so many formal rules or such a long list of examples had the author laid a solid basis of discussion and evaluation of underlying considerations.

With respect to the valuation of investments in the accounts of the holding company, in particular, it would hardly seem necessary to leave the merits of the question so unsettled as to require complete alternative solutions by the "cost value" and "actual value" methods throughout. Professor Newlove states (pages 31–32) that the "cost value" method "is required for use in the Income Tax Unit because it is impractical to report all the annual changes since the date of acquisition." He might well have imputed to the Unit, in addition, a recognition of the unsoundness of the "actual value" basis from both the legal and economic standpoints. The principle seems to be thoroughly established that corporate profits, from a legal point of view, are not a part of the property of the shareholder, regardless of the size of his holding. The stockholder may be said to have an equity in such profits, it is true, but without appropriate action of the board of directors this equity is not converted into and does not represent a property right of the stockholder. From an economic point of view the "actual value" method is equally unsatisfactory. If any basis other than cost were to be adopted in the valuation of an investment it would be actual value, that is, *market value*, and cost plus (or minus) the *pro rata* share in the increase (or decrease) in the total stock equity as shown on the books of the corporation after the date of acquisition by the shareholder clearly does not represent such actual or market value. The "actual value" method, so-called, is a hodge-podge method. It admits that cost (that is, market value at date of acquisition) represents the appropriate basis for the valuation of the holding company's investment at the outset but requires from that date on the addition to this basis of the holding company's *pro rata* share in the subsidiary's profits and credits covering the *pro rata* share in losses. In the opinion of the reviewer any stock investment, large or small, should be valued at cost (with, of course, proper ad-

justment for liquidating payments, etc.) or, if cost is to be discarded, at fair market or appraised value. In no case is the book value as shown in the accounts of the issuing corporation an appropriate basis (except as a clue to one of the other bases), and certainly the use of an illogical combination of such value with an element of cost is quite unwarranted.

Likewise abstract technical rules for dealing with consolidated "goodwill," without any vitalizing discussion, are unsatisfactory. Naturally, if the investment account of the holding company is dropped out and the assets, liabilities, and minority stock interest of the subsidiary are substituted therefor, the resulting balance sheet will not "balance." The accountant seems to feel that it is necessary to give the discrepancy a name and force a balance, and thus we have "consolidated goodwill." Is this discrepancy "goodwill" in any appropriate sense of the term? And, in particular, what is the significance of "negative goodwill," arising where the difference is a credit? These questions need careful attention in any treatise on consolidated balance sheets. At least it should be be emphasized that the explanation of the difference may lie in other factors than anticipated superior earning power. Recently, for example, the reviewer's attention was called to a case where the consolidated goodwill undoubtedly expressed for the most part the undervaluation on the subsidiary's books of a tract of timber. On pages 28–30 Professor Newlove deals with these questions and indicates a sound point of view, but the discussion should be more complete.

In the matter of the elimination of intercompany profits it will suffice to say here that this is a debatable question, and it would at least be desirable to show how the amount of such profits in the inventory in a typical case is to be determined. As a matter of fact, the situation is often so complex that it is well-nigh impossible to do more than make a rough guess of this amount.

In Chapter V, pages 75–76, the author states that dividends "declared out of the subsidiary's surplus at the date it was acquired by the holding company (frequently called liquidating dividends) are a return of investment and are not income" and hence "must be credited to the investment account." This does not appear to be correct from the standpoint of the rules governing Federal income taxes. It is the reviewer's understanding that dividends out of surplus accumulated since March 1, 1913, are income for tax purposes regardless of the date of purchase of the stock.

The author is to be commended for adhering throughout to the point that a consolidated balance sheet is "really a balance sheet of the majority interests." In some discussions of consolidated statements this point has not been sufficiently emphasized.

There would seem to be no doubt as to the general merit of the book on the technical side. It is full of examples and the solutions are generally clear and complete. The illustrations are carefully classified and arranged. Of particular help are the graphic "family trees" and the orderly procedure suggested for the more complex cases. It is a book for careful study and reference rather than for reading.

W. A. Paton

University of Michigan

Harvey Baum: A Study of the Agricultural Revolution, by Edward Sherwood Mead and Bernhard Ostrolenk. Philadelphia: University of Pennsylvania Press. 1928. 149 pp.

Harvey Baum is less a study of the agricultural revolution than of farm relief in the United States, especially of its futility, to which, in the authors' view, the agricultural revolution contributes largely. It is a readable and stimulating book, but one sure to irritate extreme proponents of farm relief, and one not destined to solve questions troubling the minds of unbiased students. The argument, somewhat altered in arrangement from the authors' presentation, is broadly as follows:

The present status of American farming is such that our farmers, as a class, "are forced to a sub-American standard of living, comparable to the living conditions from which our Italian and Polish immigrants have escaped" (Chapter II). Low prices of farm products resulting chiefly from overexpansion of agriculture, and high costs resulting chiefly from "blazing" inefficiency, are the outstanding causes. Relatively few farmers prosper under present prices; these are the converted Harvey Baums, the farmers who follow well-known but little-used methods and practices of farm management. Four methods of ameliorating the situation require discussion. On the one hand is the automatic method—abandonment of farming by the inefficient as economic pressure dictates, with diminishing total production, increasing prices, and decreasing average costs leading to prosperity for the remaining efficient producers. On the other hand are the three remedies commonly proposed: diffusion of knowledge of sound agricultural practice; coöperative marketing and the improvement of distribution; and price-lifting schemes involving governmental disposal of farm surpluses, with tariff protection for domestic requirements, as exemplified in the McNary-Haugen Bill. None of the last three remedies is regarded as offering more than a fractional solution of the problem. Hence there remains the economic process of squeezing the inefficient producers out of farming and into industry, with the attendant pains of readjustment; though industrial education for the younger generation of farmers about to be forced off the farm is suggested as an effective method of facilitating the transitional stage.

With certain features of the argument many readers will readily agree. An agricultural revolution *is* in process, especially with respect to better management and labor-saving devices (Chapters I, III, and IV). There is no immediate prospect that a considerably higher level of agricultural prices will occur "through ordinary economic channels" so long as our potential productive resources are so large: it is true that immobility of capital invested in farming prevents a rapid reduction of the volume of production; that production tends to be increased by wider use of labor-saving machinery, by wider practice of scientific farm management, and by adjustment of size of farms and their capitalization to the optimum; and that a really appreciable proportion (one fifth in the authors' view) of our crop area is now unproductive but can readily become productive (Chapter V). Immediate and general adoption of scientific farm management might well so increase production and depress prices that "the farming industry would go

quickly and in the grand manner into bankruptcy" (Chapter VI). Coöperative marketing might fail to reduce the cost of distribution enough to "meet the demands of the farmer" (Chapter VII). And price-raising schemes, even if temporarily successful, in the long run might prove disastrous by encouraging excess production and depressing prices (Chapter VIII).

But readers who accept such features of the broad argument will find their acceptance shaken by the many overstatements or heightened contrasts from which the book suffers. The picture of the present plight of agriculture is drawn in colors considerably too black. Much depends in the course of the argument on estimates of farmers' "losses" in 1926–1927—losses estimated by the authors at six billion dollars, which they characterize as the annual "cost of farm relief." One wonders why 1926–1927 alone was chosen; according to Brookmire's estimates, at least, net cash receipts of farm owners and operators were smaller in 1926–1927 than in the two preceding years. In many respects one may question the calculations from which this "loss" is derived. Ought interest on investment to be reckoned at as high a figure as 5 per cent? Ought it to be reckoned on *current* values? Ought contrasts to be drawn between average returns to farmers, including one-mule farms in the South, and urban wages heavily weighted by the industrialized North? In such contrasts, ought not weight to be given to the fact that urban workers pay more for food, fuel, and rent? To argue these matters and others in detail is beyond the scope of this review; but argument is scarcely necessary to convince most persons that the standard of living of the average American farmer is by no means "comparable to the living conditions from which our Italian and Polish immigrants have escaped."

Despite exaggerations and downright errors, the book deserves commendation. Most important is the emphasis laid on the fact that migration of the farm population to cities is not necessarily a social or an economic calamity, nor so painful to participants as has been pictured. The authors regard it, properly enough, as the automatic form of farm relief, as a tide which should not be stemmed violently and injudiciously, but which should be directed in the safest possible channels. Courage is required to adopt this conclusion in the face of current clamor. Further, the authors neatly dispose of the common view that manufacturers and merchants lose customers when farmers migrate to cities: the farmer's "destination is not the cemetery, but the city," where his purchasing power is larger rather than smaller. The common view that starvation faces us if farmers continue to abandon farms is also effectively combated by reference to the untouched productive resources of the country. And the discussion of the effect of immobility of investment on cost and price relationships in agriculture will prove illuminating to many readers.

M. K. Bennett

Food Research Institute, Stanford University

The Money Illusion, by Irving Fisher. New York: The Adelphi Company. 1928. 245 pp.

This book is a popular discussion of the evils of price instability and various possible means of securing greater stability. The first five chapters present the problem and show the direct and indirect harm resulting from fluctuations in the value of money. The rest of the book discusses remedies which may be applied by the individual, by banks and by the government. The book has the vigor, clarity and interest which always characterize Professor Fisher's writing. Professor Fisher has performed a useful service in presenting this subject in such form that the layman not only may understand but may be prepared to do his share towards the solution.

The book treats a subject which is a favorite battlefield for economists. Professor Fisher has clearly been at considerable pains to avoid controversy and to present a temperate, impartial case. The manuscript was submitted before publication to a number of students in the field. It is not surprising, however, that even after these precautions the final product should still represent Professor Fisher's own distinctive point of view. He can hardly avoid assigning to price changes, and especially to commodity prices at wholesale, a more active rôle in the business cycle than many others would concede, and, again, he implies in every argument a more direct and mathematically precise causative relation between credit and prices than the reviewer for one is willing to concede. The result is that the problem will appear to many over-simplified, the remedy too easy —a danger to which popular presentation is always peculiarly subject.

In the opinion of the reviewer there is one outstanding inadequacy in the treatment. The discussion barely mentions the principal cause of price instability. The familiar charts of the fluctuations of commodity prices at wholesale in the United States over the past 125 years show three important disturbances of price stability, all related to wars. If the price changes which accompanied the Napoleonic wars, the Civil War and the World War, and the readjustments after those wars, could be ironed out, the price chart remaining would show considerable stability. Peace-time price changes have, with some few exceptions, been relatively small in amount and have occurred over a sufficient term of years to distribute the incidence of their evil effects.

War-time price stability and peace-time price stability are two wholly different problems. War-time credit changes are not subject to the usual peace-time controls. Some measure of inflation is extremely hard to avoid. Professor Fisher draws most of his illustrations to prove the evils of price instability from war and immediate post-war periods; but when he comes to remedies he is thinking in terms of a peace-time credit system.

If we wish to avoid instability of prices and the value of money, our chief problem is to avoid wars or to finance them without inflation. This is quite different from dealing with the smaller and less violent price fluctuations of peace time. This book and other literature on the subject would be more convincing if the two problems were differentiated. Both problems need attention, but the method of treatment required is quite different.

Federal Reserve Bank of New York W. Randolph Burgess

The Finances and Financial Administration of New York City: Recommendations on Report of the Subcommittee on Budget, Finance, and Revenue, of the City Committee on Plan and Survey. New York: Columbia University Press. 1928. lxxii, 361 pp.

Two years ago, in December, 1926, a Subcommittee on Budget, Finance and Revenue was organized as a part of the City Committee on Plan and Survey for New York City. This subcommittee was charged with studying the finances and fiscal organization of New York City and with proposing recommendations for their improvement. It placed the research responsibility for its study on Professor Lindsay Rogers of Columbia University. The present volume includes the research report of Professor Rogers and his associates together with the recommendations of the subcommittee based on this report.

With a view to the practical aspects of the volume—its purposes as an incentive to action by the state legislature and the city Board of Aldermen—the recommendations of the subcommittee have been placed before the research report. The report itself has been divided into eight chapters: "The Fiscal Structure of New York City"; "The Planning of New York City's Expenditures"; "New York City's Expenditures for Salaries"; "New York City's Purchasing Agencies and Methods"; "The Revenues of New York City"; "The Assessment of Property for Taxation and Specific Assessments"; "New York City's Debt Policies"; and "Subway Finance." It is to be regretted that a proposed supplemental study on recent developments in European municipal finance has not been included. The statistical computations on which the research report is based have been included in a series of nineteen appendices.

"The financial administration and finances of New York City are not noteworthy for their simplicity," states the report in mild protest. The first and most extensive labor of the subcommittee's research staff was to reduce the confusion of New York City's financial statements to a comprehensible system. In this task they have succeeded. The one important gap in their presentation of the city's finances and financial system is their failure to distribute the total of the city's outstanding debt according to the purposes for which it was incurred. The absence of such a functional distribution of the city's debt is the more to be regretted since New York City is the one city for which the Federal Census Bureau has not made this calculation in its "Financial Statistics of Cities" series. In view of the controversy among the Interborough Rapid Transit Company, the Transit Commission and the city administration now before the Federal Supreme Court, the chapter on "Subway Finance" is particularly timely; it presents a strong argument for an increase of the subway fares.

The recommendations of the subcommittee are profuse. Some deal with fundamental factors in New York City's financial system; others are limited to minor details. Among the more important recommendations may be noted the following: a simplified set-up of budget accounts; centralization of the budget procedure in a special Department of the Budget under the mayor; preparation of a program for capital outlays over a period of years; reduction of the outstanding temporary debt of the city by shifting as much of it as possible to the tax account; preparation of an improved schedule of personnel classification and salary gradu-

ation; a broader development of the system of special assessments; and placing more of the city's services on a self-supporting basis. With a view to easing New York City's revenue problem, the subcommittee urges the state legislature to levy a gasoline tax, and also a special tax on unincorporated business enterprises as a substitute for the present remnants of the personal property tax, the revenue from these two new taxes to be divided between the state government and New York City, together with other local governments.

As a whole, the volume is rather an engineer's survey of New York City's finances than a layman's handbook. There is meat, however, for even the casual reader. Apart from its avowed purpose as a legislative guide, it is to be hoped that it will find its way into the hands of many lay readers, taxpayers and mere voters, to stimulate their interest in and to inform them upon their city's finances.

WILLIAM J. SHULTZ

National Industrial Conference Board

Die Grossstädte Nordamerikas und die Ursachen ihrer Entwicklung, by Werner Gley. Frankfurter Geographische Hefte. Frankfurt am Main: Gebrüder Knauer. 1927. 96 pp.

This study of large cities in North America was undertaken to test the generalizations about city growth that have taken form in the course of the last sixty years. Most especially it was intended to verify by historical analysis the adequacy of the thesis that commercial factors are the primary economic element, and the topographical features associated with commercial routes, the outstanding geographical factor. Although the local problems of the city site are recognized, they are not a primary feature of the investigation. Studies of the occupational classifications of urban population constitute the chief objective test of the relative importance of industrial and commercial factors. Applying this test, it appears that the largest cities were in all instances primarily commercial until the beginning of the present century. Latterly, some notable cases of industrial cities appear in the Great Lakes iron district. Industrial elements are more conspicuous in the smaller cities, below the limit of 100,000 inhabitants taken as the minimum for large cities. The author holds that industrial factors will become still more important in the future.

The distinction between industrial and commercial factors is rather arbitrarily drawn, because the elements of location in the strategically important iron towns turn more largely upon facilities for transport than upon the location of raw materials and fuel. The iron and steel cities are thus merely special cases of the commercial problem. The literalism implicit in this handling of these primary phenomena pervades the whole study. The principles are narrowly stated: little perception is shown of the relation of the primary principles to technological changes or to changes in the mass and location of the population. Though useful for its presentation of recent data, the study thus adds little that is genuinely new to the existing literature of the subject.

ABBOTT PAYSON USHER

Harvard University

Mental and Scholastic Tests, by Cyril Burt. London: P. S. King and Son, Ltd. 1927. xv, 432 pp.

This is the third impression, unrevised, of a book first published in 1921. At the time of its publication it represented probably the most noteworthy contribution to the study of mental measurement since Binet. The research on which it was based was an attempt to work out norms of performance on the Binet-Simon tests for London school children, and to compare these norms with those of standardized tests of educational attainments.

Burt differed from most of the American investigators in that he did not attempt to put forth a revision of the Binet tests, but merely placed them in the proper age-groups for London school children. He favored the use of the original scale because of its wide application and the value of obtaining comparable results, but he recognized from the beginning the grave imperfections of a scale of the sort Binet had constructed.

He differed also from other investigators by the moderation of his claims for these measures of intelligence. He never accepted the almost mystical interpretation of the results in terms of "innate" intelligence unmodified and unmodifiable by environment. He insisted from the beginning on an interpretation in terms of the purely empirical processes by which the tests were determined, for he recognized the arbitrariness of the scoring and the lack of precision of the results. He was thoroughly cautious in the interpretation of the meaning of the numerical scores and the quotients in terms of chronological age, and insisted upon a consideration of possible disturbing factors.

The importance of Burt's caution should be contrasted with the extreme claims that had been made on the basis of the scores obtained in the tests. Thus Terman attributed the superior scores obtained by children of the upper classes, "for the most part, to a superiority in original endowment," and held that "all feebleminded are at least potential criminals" (*Measurement of Intelligence*, 1916).

Burt was not, however, always cautious, and he, too, fell into one of the traditional statistical pitfalls. In studying the relationship between the results on the Binet tests and on certain educational tests, he interpreted the multiple regression equation as indicating the relative causal influence of the various factors upon the independent variable and made the extraordinary statement that "one-ninth [of the Binet mental age] is attributable to age, one-third to intellectual development, and over one-half to school attainment" on the basis of the regression equation, in terms of Binet mental age, of $.54x + .33y + .11z$. This led to the development of his very important thesis of the intimate dependence of intelligence, as measured by the tests, on scholastic attainments.

It is a pity, therefore, that the 1921 edition is reissued without revision. This statistical misinterpretation does not improve a thesis for which there is otherwise considerable evidence and which could be submitted to further research. During the past few years, moreover, several important studies which throw much light upon the environmental concomitants of intelligence have been published. By using them Burt would have been on much surer ground in 1928 than he was in 1921.

Population Statistics and their Compilation, by Hugh H. Wolfenden. (Actuarial Studies No. 3.) Actuarial Society of America. New York. 1925. 144 pp.

This compact reference work summarizes succinctly much of the information which every person engaged in serious study of population problems needs. After a brief introductory chapter the author takes up (in Chapter II) the census and its history, giving the dates of various national censuses and devoting, naturally, special attention to the census of the United States, Canada and the United Kingdom. Chapter III deals with the registration of births, deaths and marriages, taking up in turn the questions of "Errors in Census Statistics" and "Errors in Registration Statistics." The nature of these errors, as, for example, the "heaping" at certain digits of age, is familiar to every worker in vital statistics; but it is most useful to have these matters discussed here in their logical place in the general field. Chapter V takes up the preliminary adjustment for errors of the kind discussed in Chapter IV and covers also the topic of "Population Estimates." Chapter VI deals with the mathematical relations between births, deaths and populations. Chapter VII, the longest in the book, as is natural for this topic, discusses the "Construction of Mortality Tables." This is followed by a brief Chapter VIII in the "Construction of Abridged Mortality Tables." The remaining shorter chapters deal with "Methods of Comparing the Mortalities of Different Communities," the classification of "Mortality by Causes of Death," the "Use of Census and Registration Data in the Construction of Tables Relating to Marriages, Births, Orphanhood, etc.," and "Morbidity Statistics." The reviewer's use of this volume as a reference work and a guide to sources of further information has been most satisfactory, and he believes that all others working in the same field must find it similarly useful, not to say indispensable. It is with this in mind that the reviewer has thought it best, in the brief space allotted, to give a fairly detailed account of the contents of the book, so that those in need of the information offered may know that here is an excellent source to which to turn. For the quality of the volume, the names of the author and the publishers are an all-sufficient guarantee.

ALFRED J. LOTKA

Metropolitan Life Insurance Company

Representative Industries in the United States, edited by H. T. Warshow. (American Business Series.) New York: Henry Holt and Co. 1928. xiii, 702 pp.

Twenty-one industries are described in this volume. It is planned on the theory that the leaders in industry can give the most competent exposition of the difficulties and the growth of individual American industries. "Economists and journalists may be better qualified to weave the raw material from such contributions into a general pattern; but for a specific and detailed analysis of his own business, it would seem that the best qualified person is the man who has spent his life in that business." With the exception of two university professors and two professors in technical schools, the contributions come from men who either are in the industry concerned or are closely connected with it.

The academic student of economics or business will doubtless be ready to ad-

mit some of the claims of this method and will welcome its results. This volume provides an extremely useful account of present industrial technique and its historical development. It will be a useful reference work for anyone dealing with industrial statistics and industrial history.

But this method, like others, has the defects of its qualities. When such questions as taxation, tariff, labor, and even the economies of large business are under discussion, the limitations of the practical man's viewpoint become apparent. Labor problems are not discussed from the labor or from the social viewpoint but from that of the production manager. The tariff is usually discussed from the manufacturer's point of view. Mr. R. J. Anderson does declare the tariff on aluminum to be the most indefensible duty of the Fordney-McCumber Act, but this detachment is exceptional. On many questions there is clearly room for competent expositions of the difficulties of American industries from other points of view.

The volume contributes so much to our accessible knowledge of American industry that we must hope for a similar treatment of other industries. The industries described are not any more representative or typical than many others. Descriptions of other industries, whether typical or not, would be highly useful. Unevenness could be reduced and the general quality raised if the individual contributors were held more closely to the editor's excellent general plan.

R. S. Meriam

Amherst College

Development of the Population from 1910 to 1925: Natality and Mortality in the Years 1923 to 1925 in Germany, by E. Roesle. Berlin: International Health Year-Book. 1927. 22 pp.

This publication takes up in detail the changes in the population of the German Reich between the years 1910 and 1925. The effect of the war was clearly reflected in the smallness of the increase in population, in the fact that males increased much less than females, in the low birth rate in recent years and in the large increase in the number of widows. It is pointed out that the density of the population of the Reich has increased considerably, principally because the territories ceded to other countries as a result of the war were the less densely settled parts of Germany. This increase in density of the population is also given as a reason for the lowered birth rate.

Birth and death statistics are analyzed, showing total birth rates by states for recent years, births classified as legitimate and illegitimate, live births and still births, mortality rates by states, sexes and ages and seasonal variations in mortality. Leading causes of death are listed, together with the number of deaths and the death rates for each cause. Infant mortality is examined at length and is classified according to cause, sex, age, legitimate and illegitimate. The paper is distinctly statistical in nature and is compactly written, so that a review stating results in detail would be only a reproduction of the article.

Rainard B. Robbins

The Union Labor Life Insurance Company, Washington, D. C.

Internationale Statistik der Genossenschaften, by Karl Ihrig. (Veröffentlichungen der Ungarischen Gesellschaft für Statistik, No. 5.) Berlin: Struppe & Winckler. 1928. xxiv, 275 pp.

This book deals separately with consumers' societies, credit societies and agricultural societies. The period covered is in most cases the last year for which statistics are available for each country (beginning with Armenia, 1920, and continuing to Russia and other countries, 1925), but some of the investigations pertain to the twentieth century as a whole. Most of the European countries and the United States are dealt with; occasionally other countries are included.

The discussion pertains to almost every phase of coöperative activities for which statistics are available—membership, distribution of coöperatives, capital, business activities (sales, purchases, prices, handling of surplus, loans, etc.), internal organization, and so on.

The interpretation of the statistical material is at its best when the author simply states the facts and explains the development without theorizing. That is the case in most of the chapters. Only in a few instances does he use statistics in order to prove or refute theories, e. g., in discussing the question as to whether there are "coöperatively gifted" races or whether external circumstances determine the extent and distribution of coöperative societies. There his reasoning is not convincing.

One must admire the author's industry in collecting the material and will agree with many of his proposals for the organization of the statistics of coöperative societies; but one should be cautious in accepting the author's theories on coöperative societies.

JURGEN KUCZYNSKI

Washington, D. C.